

EXHIBIT 2

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15 McKayla Largin, videographer

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17 Alanna Horan
18 Bill Williams
Dennis Reich
19 Deanna Havai
Tim Thompson
20 Zina Bash
Morris Maslia
21 Norman Jones
Allison O'Leary
22 Kevin Dean

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February 13, 2025

9:13 a.m.

P R O C E E D I N G S

THE VIDEOGRAPHER: Good

morning. We are going on the record at 9:13 a.m. on February 13, 2025. This is Media 1 deposition recording of R. Jeffrey Davis in the matter of Camp Lejeune Water Litigation filed in the District Court for the Eastern District of North Carolina, Case Number 7:23-CV-00897.

This deposition is being held at the Utah Attorney General's office in Salt Lake City, Utah. My name is McKayla Largin. I'm the videographer. And Vickie Larsen is the court reporter.

Will all counsel state who they represent for the video record.

MS. SILVERSTEIN: Kailey Silverstein for the United States.

MR. ANWAR: Haroon Anwar for the United States.

MR. ANTONUCCI: Giovanni Antonucci for the United States.

1 MS. BOLTON: Devin Bolton for
2 the plaintiffs.

3 MS. BAUGHMAN: Laura Baughman
4 for the plaintiffs.

5 THE VIDEOGRAPHER: Will the
6 court reporter please swear in the
7 witness.

8 R. JEFFREY DAVIS,
9 called as a witness, having been duly sworn,
10 was examined and testified as follows:

11 EXAMINATION

12 BY MS. SILVERSTEIN:

13 Q. Good morning, Mr. Davis. My
14 name is Kailey Silverstein.

15 THE REPORTER: I can't hear
16 him.

17 MS. BOLTON: Kevin Dean for the
18 plaintiffs.

19 Q. BY MS. SILVERSTEIN: My name's
20 Kailey Silverstein. I'm with the Department
21 of Justice and we represent the United States
22 here in this litigation.

23 Can you please state your full
24 name.

25 A. Richard Jeffrey Davis.

1 Q. And is calling you Mr. Davis
2 fine?

3 A. Sure.

4 Q. Great.
5 And what's your current
6 address?

7 A. 447 -- 447 Eastview Drive,
8 Alpine, Utah 84004.

9 Q. Great.
10 Have you had your deposition
11 taken before?

12 A. No.

13 Q. All right. I'm going to start
14 by just going over some of the rules of the
15 road.

16 A. Sure.

17 Q. The attorneys might have gone
18 over some of this with you previously, so it
19 might sound familiar.

20 Do you understand that you are
21 under oath?

22 A. Yes.

23 Q. And do you understand that this
24 is a court proceeding, even though we're not
25 in a courtroom?

1 A. Yes.

2 Q. Do you understand that you're
3 under the penalty of perjury?

4 A. Yes.

5 Q. The court reporter is taking
6 down everything that we say today, so it's
7 important to do things like answer questions
8 out loud. I know sometimes in conversation
9 we're inclined to nod our head or shake our
10 head. That's hard to get down on the
11 transcripts. If you could answer all of the
12 questions verbally, that would be great.

13 Does that make sense?

14 A. Yes.

15 Q. You and I should also do our
16 best not to interrupt each other. There
17 might be times today that you anticipate
18 correctly what question I'm going to ask.
19 I'll ask that you please let me ask my full
20 question anyway, and I'll do my best to make
21 sure that you get your complete answer out
22 before I ask the next question.

23 Does that make sense?

24 A. Yes.

25 Q. Do you understand that you're

1 the only one testifying today?

2 A. Yes.

3 Q. If during this deposition I ask
4 a question that you don't understand or
5 doesn't make sense, please let me know and I
6 will do my best to clarify and make sure
7 we're on the same page with what I'm asking.
8 If you answer the question, then I will
9 assume that you understood what I was asking.

10 Does that make sense?

11 A. Yes.

12 Q. You might hear your attorney
13 object during this objection -- during this
14 deposition, excuse me. If that's the case,
15 unless she instructs you not to answer, you
16 can go ahead and answer the question.

17 Does that make sense?

18 A. Yes.

19 Q. We'll take breaks during this
20 deposition. I usually try and take a break
21 about every hour. If you need a break before
22 that, please just let me know and we can --
23 we can take a break.

24 The only thing that I'll ask is
25 that if I've already asked a question that

1 you haven't answered yet, that you'll go
2 ahead and answer that question before we take
3 a break.

4 Does that make sense?

5 A. Yes.

6 Q. Okay. I am handing you what I
7 will mark as Exhibit 1.

8 (Exhibit 1 was marked for identification.)

9 Q. BY MS. SILVERSTEIN: This is
10 your notice of deposition and subpoena.

11 Have you seen these documents
12 before?

13 A. Yes.

14 Q. Do you --

15 MS. BAUGHMAN: Okay, fine.

16 Q. BY MS. SILVERSTEIN: My
17 understanding is that you've been retained by
18 the plaintiffs to offer an expert opinion in
19 the In Re: Camp Lejeune Water Litigation; is
20 that correct?

21 A. Yes.

22 Q. When were you hired?

23 A. I can't remember the exact
24 date, but it was the end of September.

25 Q. Okay. And who hired you?

1 A. This legal team.

2 Q. When you say "September," is
3 that September 2024?

4 A. Yes, September 2024.

5 Q. When you were hired in
6 September, was it your understanding that it
7 was to write a report due in October 2024?

8 A. Yes, that's correct.

9 Q. If you could turn to
10 Attachment A, which is the last -- on the
11 back side of the second-to-last page and the
12 last page.

13 MS. BAUGHMAN: I think his is
14 in different order. That's why I was
15 looking at it.

16 Q. BY MS. SILVERSTEIN: Do you see
17 Attachment A? Try the second. There you go.
18 Okay. And are you on Attachment A?

19 The document states "Pursuant
20 to the Federal Rules of Civil Procedure
21 30(b)(2) and 45, the United States makes the
22 following requests for the production of
23 non-privileged documents, communications, and
24 materials, including but not limited to, any
25 electronically stored information, data,

1 technical files, and photographs, within your
2 possession, custody, or control."

3 Do you see where I'm reading
4 that?

5 A. Uh-huh.

6 Q. It then has as Number 1: "All
7 emails, letters, correspondence, text
8 messages, conversations, chats, voicemails,
9 data, technical files, and other
10 communications pertaining to Camp Lejeune
11 sent or received prior to your retention as
12 an expert in this matter, including but not
13 limited to, from, or with:

14 "Morris Maslia, Robert Faye,
15 Jason Sautner, David Savitz, Rene
16 Suarez-Soto, Susan Martel, Scott Williams,
17 Frank Bove, Mike Partain, Jerry Ensminger,
18 Lori Freshwater."

19 Do you have any emails,
20 letters, correspondence, text messages,
21 conversations, chats, or voicemails from any
22 of those individuals?

23 A. No.

24 MS. BAUGHMAN: That's prior to
25 being retained; right?

1 THE WITNESS: Yeah.

2 MS. SILVERSTEIN: Correct.

3 Q. The document then provides
4 "All" letters -- "emails, letters,
5 correspondence, text messages, conversations,
6 chats, voicemails, or other communications
7 to, from, or with any individual who has
8 filed a claim with the Department of the Navy
9 or Eastern District of North Carolina
10 pursuant to the Camp Lejeune Justice Act of
11 2022."

12 Do you have any of those
13 communications?

14 A. No.

15 MS. BAUGHMAN: Just for the --
16 just for the -- just for -- give a
17 little pause --

18 THE WITNESS: Okay.

19 MS. BAUGHMAN: -- before so I
20 can say something if I want to.

21 Just for the record, we've
22 lodged some objections. I don't think
23 he has any such documents, but I'm not
24 sure how he's supposed to know who has
25 filed a claim, which we've objected

1 to. So just for the record, we've
2 made objection to that.

3 And now you can answer.

4 Q. BY MS. SILVERSTEIN: Mr. Davis,
5 do you have any of those communications with
6 anyone that's filed a claim pursuant to the
7 Camp Lejeune Justice Act?

8 A. No.

9 Q. And then it says "All bills,
10 invoices, or other documents reflecting
11 compensation..."

12 Do you have -- aside from the
13 documents that have been produced by the
14 plaintiffs already, do you have any
15 additional bills, invoices, or compensation
16 documents?

17 MS. BAUGHMAN: He doesn't know
18 what we produced, so -- I produced the
19 documents.

20 Q. BY MS. SILVERSTEIN: Do you
21 have any -- any documents besides monthly
22 bills that you've provided to the attorneys?

23 A. Any additional documents?

24 Q. Any additional bills, invoices,
25 or other compensation documents.

1 A. No.

2 Q. Before you were retained, had
3 you heard about Camp Lejeune?

4 A. Like, that it existed?

5 Q. Had you heard anything about
6 Camp Lejeune?

7 A. I know that it's a military
8 base.

9 Q. Okay. Had you heard anything
10 about the water modeling related to
11 Camp Lejeune?

12 A. No.

13 Q. How did you hear about
14 Camp Lejeune as a military base before you
15 were retained?

16 A. In my career, I've done work
17 for the Department of Defense, early on in my
18 career, and so I'm familiar with most of the
19 military bases here in the country.

20 Q. Was that work at all related to
21 the Camp Lejeune --

22 A. No.

23 Q. -- military base?

24 You submitted a joint report
25 with Dr. Jones.

1 How are you familiar with him?

2 A. I've known him for, I don't
3 know, about 35 years. He was my adviser when
4 I was a graduate student.

5 Q. And have you kept in contact
6 with him during -- on and off at least,
7 during that entire 30-year span?

8 A. Yes.

9 Q. Have you and Dr. Jones worked
10 together before?

11 A. Yes, we worked together before.

12 Q. On what kind of work?

13 A. Well, we -- we used to work
14 together for several years doing training
15 courses and software development and -- and
16 groundwater modeling consulting.

17 Q. Prior to the reports that you
18 co-authored in the Camp Lejeune litigation,
19 when had you most recently worked with
20 Dr. Jones?

21 A. Probably 2007 or 2008.

22 Q. Does any of your prior work
23 with Dr. Jones include work on expert reports
24 for litigation?

25 A. No.

1 Q. And you mentioned that you did
2 work with the Department of Defense.

3 When did you work with the
4 Department of Defense?

5 A. This was mostly in the 1990s.

6 Q. Okay. And what kind of work
7 did you do with the Department of Defense?

8 A. Well, we had a joint contract
9 with them to develop groundwater modeling
10 software.

11 Q. Do you know what -- well, so
12 what groundwater modeling software did you
13 work to develop?

14 A. We developed a package called
15 the Groundwater Modeling System, GMS.

16 Q. And do you know what that
17 was -- what that was used for?

18 MS. BAUGHMAN: Objection.
19 Form.

20 THE WITNESS: To do groundwater
21 modeling.

22 Q. BY MS. SILVERSTEIN: Sure.

23 Do you know any specific
24 groundwater modeling projects that was used
25 for?

1 A. By who?

2 Q. By the Department of Defense.

3 A. Yes, I'm quite familiar that
4 they used it all over their -- their military
5 installations to do groundwater modeling.

6 Q. Did you work on -- aside from
7 helping develop the software, did you work on
8 any of the groundwater modeling projects that
9 used GMS?

10 A. No.

11 Q. Was the 1990s when you most
12 recently worked with the Department of
13 Defense?

14 A. Yes.

15 Q. And what did -- what was your
16 role in helping develop GMS?

17 A. I oversaw the development. I
18 had students, graduate students, working for
19 me.

20 Q. Graduate students from where?

21 A. From Brigham Young University.

22 Q. Were you working for Brigham
23 Young at the time?

24 A. Yes.

25 Q. What were you doing there?

1 A. I had a research position.

2 Q. Who suggested that you and
3 Dr. Jones co-author the reports for the
4 Camp Lejeune litigation?

5 A. That was an agreement by the
6 two of us, Dr. Jones and myself.

7 Q. And how did that agreement come
8 to be?

9 A. We felt like in order to
10 produce what was asked by the legal team,
11 that it would take the resources of both of
12 us.

13 Q. Okay. Did Dr. Jones reach out
14 to you to work on the project or did you
15 reach out to him?

16 A. He actually reached out to me
17 after the legal team had reached out to me.

18 Q. All these many documents.

19 A. Fun reading.

20 Q. I'm handing you Exhibit 2.
21 (Exhibit 2 was marked for identification.)

22 Q. BY MS. SILVERSTEIN: This is
23 Exhibit 2. It is titled "Tarawa Terrace Flow
24 and Transport Model Post-Audit."

25 Was this report prepared by

1 you?

2 A. Yes.

3 Q. Jointly with Norman Jones?

4 A. Yes.

5 Q. Is this a fair and accurate
6 copy of your report?

7 A. Well, not having gone through
8 every single page, I'm assuming that it is.

9 Q. And is it signed on the first
10 page --

11 A. Yes.

12 Q. -- by you?

13 What was the process for you
14 and Dr. Jones working together on this
15 report?

16 MS. BAUGHMAN: Objection to the
17 form.

18 THE WITNESS: I would -- I
19 guess I'm going to ask how detailed do
20 you want? What kind of answer do you
21 want?

22 Q. BY MS. SILVERSTEIN: Sure.

23 Kind of a high-level look.

24 What -- what kind of process did you and

25 Dr. Jones have? Like, for example, were you

1 working in tandem and then at the end would
2 discuss your findings? Were you working on
3 different pieces? What did that look like?

4 MS. BAUGHMAN: Object to the
5 form.

6 THE WITNESS: I primarily was
7 in charge of the model and running the
8 model and producing the results.

9 MS. SILVERSTEIN: Okay.

10 THE WITNESS: And Dr. Jones and
11 I would discuss the results. I would
12 send him the outputs, which he would
13 create certain graphs and figure --
14 certain graphs, and then we would
15 discuss those. And then, you know, in
16 preparation for the report, my staff
17 would make the official figures and
18 tables to go into the report.

19 Q. BY MS. SILVERSTEIN: Okay. Are
20 all of the opinions that are in this report
21 yours?

22 A. Yes. Jointly -- jointly ours.

23 Q. Are there any opinions that are
24 only Dr. Jones' opinions and not yours?

25 A. No.

1 Q. If I assume that you either
2 wrote or otherwise approved of every word in
3 this report; is that -- is that accurate?

4 A. Yes.

5 Q. If at any point I ask you about
6 a statement in this report that you didn't
7 write or approve of before the report was
8 finalized and it is Dr. Jones' work, I'll ask
9 that you please let me know. If you don't,
10 I'm going to assume that all the statements
11 are -- are yours; is that fair?

12 A. Yes.

13 Q. And if I refer to this report
14 as your "initial report," will you understand
15 that I'm talking about the report submitted
16 on October 25, 2024?

17 A. Yes.

18 Q. Okay. I'm handing you
19 Exhibit 3.

20 (Exhibit 3 was marked for identification.)

21 Q. BY MS. SILVERSTEIN: Okay.
22 This is titled "Rebuttal Report Regarding
23 Tarawa Terrace Flow and Transport Model
24 Post-Audit."

25 Was this report prepared by

1 you?

2 A. Yes.

3 Q. And is it a fair and accurate
4 copy of your rebuttal report?

5 A. This -- again, assuming that
6 this is complete, yes.

7 Q. Okay. And my understanding
8 again is that you and Dr. Jones worked
9 jointly on this report?

10 A. Yes.

11 Q. And it's correct that all of
12 the opinions in this report are yours?

13 A. Yes.

14 Q. And just like with the initial
15 report, if there's anything that I ask you
16 about in the rebuttal report that is not
17 yours, I'll assume that you're -- you'll let
18 me know that; is that fair?

19 A. Yes.

20 Q. And if I refer to the report
21 submitted on January 14, 2025, as the
22 "rebuttal report," will you understand what
23 I'm referring to?

24 A. Yes.

25 Q. You mentioned a few minutes ago

1 that you primarily worked on the modeling and
2 Dr. Jones did the graphs and figures.

3 Was there any other part of the
4 reports that Dr. Jones worked on?

5 MS. BAUGHMAN: Objection.
6 Form.

7 THE WITNESS: Besides the
8 analysis and writing?

9 Q. BY MS. SILVERSTEIN: So if
10 there are pieces of the initial report or
11 rebuttal report that are describing or
12 interpreting the model results, would that
13 have been work performed by Dr. Jones, by
14 you, or by both of you?

15 MS. BAUGHMAN: Objection.
16 Form.

17 THE WITNESS: Both of us.

18 Q. BY MS. SILVERSTEIN: I want to
19 talk to you about what, if anything, you did
20 to prepare for this deposition today.

21 Did you do any kind of
22 preparation for your deposition?

23 A. Yes.

24 Q. What did you do?

25 A. I read -- I reread our reports

1 and read through other reports from the other
2 experts.

3 Q. What reports from other experts
4 did you read?

5 A. I read the rebuttal reports and
6 reread some of the initial modeling reports
7 from the initial original model that was
8 done.

9 Q. When you say you read the
10 rebuttal reports, are you referring to the
11 rebuttal reports of Dr. Konikow,
12 Dr. Sabatini, and Morris Maslia?

13 A. Not Dr. Sabatini's.

14 Q. At any point did you read
15 Dr. Sabatini's report?

16 A. I might have skimmed through
17 it.

18 Q. Okay. For -- to prepare for
19 your deposition, did you review the expert
20 report from Dr. Aral?

21 A. I might have skimmed through
22 that.

23 Q. Had you read that report
24 previous to preparing for this deposition?

25 A. I don't believe so.

1 Q. To prepare for your deposition,
2 did you read the reports of
3 Dr. Spiliotopoulos or Dr. Hennet?

4 A. Yes.

5 Q. Had you read those -- had you
6 reviewed those reports prior to preparing for
7 the deposition?

8 A. Not as thoroughly as I read
9 them, but in preparing our rebuttal report.

10 Q. Aside from the other expert
11 reports and your own expert reports, did you
12 review -- you said that you reviewed ATSDR
13 reports; is that right?

14 A. Correct.

15 Q. Which reports did you review?

16 A. The Chapter A and Chapter F,
17 primarily.

18 Q. And had you reviewed Chapters A
19 and F prior to writing your own reports?

20 A. Correct.

21 Q. And just to clarify, is that
22 Chapter A and Chapter F for Tarawa Terrace?

23 A. Correct.

24 Q. Did you review any other ATSDR
25 reports to prepare for this deposition?

1 A. No.

2 Q. And did you list all of the
3 materials that you reviewed to prepare your
4 reports in your materials considered list?

5 A. Yes.

6 Q. To prepare for your deposition,
7 did you speak with or meet with anybody?

8 A. Yes.

9 Q. Who did you meet with?

10 A. The -- our legal team.

11 Q. Do you remember who
12 specifically on the legal team?

13 A. Yes.

14 Q. And who is that?

15 A. Specifically Devin and Laura.

16 Q. Was that meeting -- did you
17 have one meeting or multiple meetings?

18 A. One meeting.

19 Q. Was that in person or via some
20 sort of tele meeting?

21 A. In person, in my office,
22 yesterday.

23 Q. About how long did that meeting
24 last?

25 A. Roughly half the day.

1 Q. And did you review any
2 documents during that meeting?

3 A. Yes.

4 Q. What documents did you review?

5 A. Our two original post-audit
6 report and the rebuttal report.

7 Q. Did you speak with Dr. Jones
8 about your deposition?

9 A. Yes.

10 Q. When did you speak with
11 Dr. Jones?

12 A. Yesterday at the same meeting.

13 Q. Was he present -- you mean he
14 was present at that meeting with Laura and
15 Devin?

16 A. Yes.

17 Q. Have you spoken to him any
18 other time about the deposition?

19 A. Yes.

20 Q. When was that?

21 A. Multiple times over the last
22 several months.

23 Q. Aside from Dr. Jones, Laura,
24 and Devin, was anybody else present at the
25 meeting that you had yesterday?

1 A. Part of the meeting was
2 attended by Kevin.

3 Q. Okay. Was anybody else present
4 for any part of the meeting?

5 A. No.

6 Q. Have you reviewed any
7 depositions that you didn't list in your
8 materials considered list?

9 MS. BAUGHMAN: Objection.
10 Form.

11 Can you show him the materials
12 considered list?

13 MS. SILVERSTEIN: Yeah. I'll
14 pull it up in a minute.

15 Q. But I -- so Dr. Aral's
16 deposition took place last week. Did you
17 review the transcript from Dr. Aral's
18 deposition?

19 A. Yes.

20 Q. When did you review that?

21 A. Last week.

22 Q. Mr. Maslia was deposed in 2024.
23 Did you review the transcript from that
24 deposition?

25 A. No.

1 Q. He -- Mr. Maslia was also
2 deposed related to Camp Lejeune in 2010. Did
3 you review that deposition?

4 A. No.

5 Q. Did you review the deposition
6 of Dr. Dan Waddill?

7 A. No.

8 Q. Did you review the deposition
9 of Rene Suarez-Soto?

10 A. No.

11 Q. Did you review the deposition
12 of Jason Sautner?

13 A. No.

14 Q. Did you review the deposition
15 of Dr. Frank Bove?

16 A. No.

17 Q. Did you review the deposition
18 of Dr. Christopher Rennix?

19 A. No.

20 Q. Did you review the deposition
21 of Dr. Christopher Ray?

22 A. No.

23 Q. And did you review the
24 deposition of Dr. Susan Martel?

25 A. No.

1 Q. And you said earlier that you
2 have never been deposed before; is that
3 right?

4 A. Correct.

5 Q. Have you ever testified in a
6 trial before?

7 A. No.

8 Q. Have you prepared an expert
9 report for a court case before?

10 A. Yes.

11 Q. About how many times?

12 A. Twice.

13 Q. Do you recall how long ago
14 those were?

15 A. Yes.

16 Q. When were they?

17 A. The first one was in 2022, and
18 the second one was in 2024.

19 Q. What kind of cases were
20 those -- did you prepare the -- the expert
21 report for?

22 A. The first one was for an MDL
23 litigation case.

24 Q. And was that the -- that's the
25 2022 report that you --

1 A. Correct.

2 Q. What kind of report did you
3 prepare?

4 MS. BAUGHMAN: Objection.

5 Form.

6 THE WITNESS: It was an expert
7 report on behalf of my client.

8 Q. BY MS. SILVERSTEIN: What was
9 the subject matter of the report?

10 A. Groundwater contamination.

11 Q. Did you do a groundwater model
12 for that report?

13 A. Yes.

14 Q. Was it a -- what kind of model
15 was it?

16 A. What do you mean?

17 Q. Did you -- was it a post-audit?

18 A. No. It was -- we built a
19 model.

20 Q. Okay. And when you say you
21 built a model, were the -- was the model
22 hindcasting?

23 A. Yes.

24 Q. About how many years of
25 hindcasting did the model look at?

1 A. Maybe 50 -- no. I can't
2 remember.

3 Q. Do you remember if it was more
4 or less than 20 years?

5 A. It -- it could have been 20.

6 Q. What MDL was that for?

7 A. It was the MDL for 3M.

8 Q. And what -- what were your
9 opinions in that report?

10 MS. BAUGHMAN: I'm not sure if
11 he produced the report or not, so I
12 don't know if this -- he was a
13 consulting or a testifying expert.

14 So to the extent if you
15 didn't -- if you didn't produce the
16 report to the other side, there -- it
17 may be confidential, so leave it up to
18 you to let us know that.

19 THE WITNESS: It -- it was sent
20 to the other side.

21 MS. BAUGHMAN: Okay. There you
22 go.

23 Q. BY MS. SILVERSTEIN: Was this
24 the 3M earplugs litigation?

25 A. The 3M what?

1 Q. Earplugs litigation.

2 A. No.

3 Q. What --

4 A. The 3M AFFF.

5 Q. Was your report on behalf of
6 the plaintiffs or of the defendant?

7 A. To -- on behalf of 3M.

8 Q. And what was the site or
9 location that you were modeling?

10 A. Stuart, Florida.

11 Q. What -- and you said this was
12 the AFFF litigation. Were you modeling PFOS?

13 A. Yes.

14 Q. Were there any other
15 contaminants that you were modeling?

16 A. No.

17 Q. How large was the area that you
18 modeled?

19 A. Like in square miles?

20 Q. Yeah, that works.

21 A. I think it -- if I -- yeah, I'm
22 not sure.

23 Q. Okay. Was it a flow or a
24 transport model?

25 A. Both.

1 Q. Both.

2 And what kind of calibration
3 data was available to you?

4 A. There was both flow and
5 concentration data that was used.

6 Q. Did you have data available
7 during the time periods that you were
8 hindcasting?

9 MS. BAUGHMAN: Objection.
10 Form.

11 THE WITNESS: I would say
12 partially.

13 Q. BY MS. SILVERSTEIN: What do
14 you mean by "partially"?

15 A. It's -- it's hard to say did
16 you have all of the data. We had some data.

17 Q. Did you have data for every
18 year that you were modeling?

19 A. No, no.

20 Q. Did you -- do you recall how
21 many pieces of data -- or data points you had
22 to use for calibration?

23 A. No.

24 Q. Did you have data from the
25 earliest year or two that you were

1 hindcasting?

2 MS. BAUGHMAN: Objection.

3 Form.

4 THE WITNESS: No, I don't
5 recall.

6 Q. BY MS. SILVERSTEIN: And do you
7 remember what time span you were modeling? I
8 know you said you don't remember the exact
9 number of years, but was this, for example,
10 in the 2000s? Before then?

11 A. It was roughly from the 2000s
12 and then it went forward into the future.

13 Q. By "in the future" do you
14 mean -- were you hindcasting up to the -- the
15 date that you were working on the model?

16 A. Correct.

17 Q. And did you have, like, for
18 2022, present-day data?

19 A. I believe so, yes.

20 Q. And what were the results of
21 the model being used for?

22 A. To understand the movement of
23 PFOS AFFF material in the ground.

24 Q. And you said there was another
25 expert report that you worked on in 2024; is

1 that right?

2 A. Correct.

3 Q. What kind of case was that for?

4 A. I was representing our client
5 in Minnesota, and they were being accused of
6 impacting groundwater and surface water
7 bodies.

8 Q. What kind of contaminants?

9 A. No contaminants.

10 Q. You said "No contaminants," so
11 were you doing a water model?

12 A. Correct.

13 Q. What kind of model were you
14 working on?

15 A. A groundwater model.

16 Q. Okay. So were you looking
17 at -- if you weren't looking at contaminants,
18 what -- what were you looking at?

19 A. Impacts to groundwater and
20 impacts to surface water bodies.

21 Q. The impacts of what?

22 A. From pumping from our client.

23 Q. Do you -- so would that
24 include, for example, like, how the water
25 levels changed or how the movement of the

1 water changed?

2 A. Correct.

3 Q. How large of an area were you
4 modeling?

5 A. That was several square miles.
6 That was probably 150 square miles, maybe
7 120 square miles.

8 Q. Do you recall if the modeling
9 area you looked at in 2024 was bigger or
10 smaller than the area you looked at in your
11 2022 report?

12 A. Bigger.

13 Q. What kind of data piece --
14 points did you have available to you for the
15 2024 model?

16 A. Monitoring level data, stream
17 gauge data, stage level data in lakes,
18 recharge data, lots of reports of
19 stratigraphy and climate and -- generally the
20 data that goes into a groundwater model.

21 Q. When you say "generally the
22 data that goes into a groundwater model," are
23 there specific types of data that you're
24 referring to?

25 A. Well, generally, groundwater

1 models have lots of parameters. Things like
2 hydraulic connectivity, storage and porosity,
3 elevations, all those kind of parameters.

4 Q. And ideally would those kind of
5 parameters be site-specific?

6 MS. BAUGHMAN: Objection.
7 Form.

8 THE WITNESS: Well, you want to
9 try to match the specific site, yes,
10 so...

11 Q. BY MS. SILVERSTEIN: Do you
12 remember how long of a time period you were
13 modeling in the 2024 report?

14 A. We probably spent six months,
15 eight months on building that model.

16 Q. Were you -- was that a
17 hindcasting model or a -- a forward-looking
18 model?

19 A. Both.

20 Q. Okay. In terms of the
21 hindcasting time period, how many years were
22 you hindcasting?

23 A. I can't remember.

24 Q. Do you remember if it was more
25 or less than ten years?

1 A. It was more.

2 Q. Do you remember if it was more
3 or less than 20 years?

4 A. I believe it was more.

5 Q. Okay. Did you have data points
6 or at least a data point for every year that
7 you modeled?

8 A. No.

9 Q. How many years -- did you have
10 data point -- a data point for the earliest
11 year that you modeled?

12 A. I can't remember.

13 Q. I want to talk again about the
14 2022 report that you did.

15 Were the results of that model
16 used to estimate exposure in individuals?

17 MS. BAUGHMAN: Objection.

18 Form.

19 THE WITNESS: I don't know.

20 Q. BY MS. SILVERSTEIN: Do you
21 know what the results of that model were used
22 for?

23 MS. BAUGHMAN: Objection.

24 Form.

25 THE WITNESS: I would say yes.

1 Q. BY MS. SILVERSTEIN: And what
2 was that?

3 A. To understand the -- the extent
4 and movement of the AFFF in the groundwater.

5 Q. Would it be correct to say that
6 that model estimated contaminant
7 concentrations in the water?

8 A. Yes.

9 Q. Aside from the expert reports
10 that we discussed in 2022 and 2024 and your
11 reports in the Camp Lejeune litigation, have
12 you worked on -- have you written any other
13 expert reports?

14 MS. BAUGHMAN: Objection.
15 Form.

16 You mean for litigation?

17 MS. SILVERSTEIN: Yes.

18 Q. For litigation, have you
19 written any other expert reports?

20 A. That I -- that was signed by
21 me, no.

22 Q. Have you worked on other expert
23 reports for litigation?

24 A. Yes.

25 Q. Who did you work with?

1 MS. BAUGHMAN: Again, just
2 caution you about confidentiality and
3 leave it up to you to protect whatever
4 confidential information you might
5 have of your clients; okay?

6 THE WITNESS: I would say I
7 can't -- I can't say.

8 Q. BY MS. SILVERSTEIN: Did you
9 work with Dr. Jones on expert reports --

10 A. No.

11 Q. -- for litigation?

12 A. No.

13 Q. Have you -- aside from the
14 expert reports that we've discussed and
15 expert reports that you may have helped on
16 but did not sign, have you been involved in
17 any kind of -- have you otherwise been
18 involved in litigation?

19 A. Yes.

20 Q. What kind of litigation?

21 A. Litigation cases involving
22 groundwater, groundwater impacts, groundwater
23 withdrawals.

24 Q. All right. And are there cases
25 that you've been involved in involving

1 groundwater impacts or withdrawals that you
2 did not prepare or work on an expert report
3 for?

4 A. Yes.

5 Q. So how were you -- what was
6 your role in those cases?

7 A. Generally it was doing
8 groundwater modeling.

9 Q. Okay. And so would you then do
10 groundwater modeling and not prepare a
11 report?

12 A. I was -- I had a role of
13 basically a consulting expert.

14 Q. Okay. So you did work and it
15 wasn't disclosed in the case; is that right?

16 A. Correct.

17 Q. What kind of -- were any of
18 those models that you worked on hindcasting
19 models?

20 MS. BAUGHMAN: And these are
21 just for litigation purposes that
22 you're asking?

23 Q. BY MS. SILVERSTEIN: For
24 litigation purposes for any of the models
25 that you worked on as a consulting expert

1 hindcasting models.

2 A. I would say yes, but I couldn't
3 tell you -- I couldn't remember, you know,
4 specific ones, but I would say yes.

5 Q. Were any of the reports that
6 you've worked on that weren't disclosed in
7 litigation, were any of those post-audits?

8 MS. BAUGHMAN: Objection.

9 Form.

10 THE WITNESS: Describe your
11 definition of post-audit.

12 Q. BY MS. SILVERSTEIN: So that --
13 that's a great question. How would you title
14 the -- your report as a post-audit? What do
15 you mean by "post-audit"?

16 A. In this sense, for this
17 particular case, we took an existing
18 calibrated groundwater and flow transport
19 model and extended it, and extended it
20 forward in time and looked at the results of
21 that model compared to data that existed
22 within that extended time.

23 Q. Do you recall any other
24 instances where you've taken an existing
25 model that's already been calibrated and

1 looked to see how it performs with additional
2 data points after the model period?

3 A. Yes.

4 Q. In what circumstances?

5 A. I have a current one in the
6 state of New Jersey where I do that very
7 thing.

8 Q. Is that for litigation?

9 A. Yes. But that litigation was
10 settled last year.

11 Q. Okay. What litigation was
12 that?

13 MS. BAUGHMAN: This is ongoing,
14 Jeff, that I'm counting on you for the
15 confidentiality issue; okay?

16 THE WITNESS: Yeah, I probably
17 should not say.

18 Q. BY MS. SILVERSTEIN: What --
19 what was your -- if I refer to the model that
20 you mentioned in New Jersey as a post-audit,
21 will you understand what I'm referring to?

22 A. (Witness nods head.)

23 Q. What was the post-audit -- what
24 were the post-audit results used for?

25 MS. BAUGHMAN: Objection.

1 Form.

2 THE WITNESS: Just to
3 understand the movement of the
4 contamination plume with the new data.

5 Q. BY MS. SILVERSTEIN: And to
6 your knowledge, was the New Jersey post-audit
7 that you worked on used to estimate exposure
8 in specific individuals?

9 MS. BAUGHMAN: Objection.

10 Form.

11 THE WITNESS: No.

12 Q. BY MS. SILVERSTEIN: How much
13 are you being paid for your work on this
14 case?

15 A. I believe it's stated in my --
16 both of my reports. I'm being paid 498 an
17 hour.

18 Q. How much have you billed to
19 date?

20 MS. BAUGHMAN: Objection.

21 Form.

22 I believe we produced the
23 bills.

24 Q. BY MS. SILVERSTEIN: How much
25 have you been billed to date?

1 MS. BAUGHMAN: If you know.

2 THE WITNESS: I've -- I believe
3 Integral's bills to the legal team are
4 roughly 160,000.

5 Q. BY MS. SILVERSTEIN: How much
6 have you been paid for your work on this
7 case?

8 MS. BAUGHMAN: Objection.
9 Form.

10 THE WITNESS: I'm a consultant
11 for a firm that I'm a principal in, so
12 it's just my normal salary.

13 Q. BY MS. SILVERSTEIN: Okay. Do
14 you know how much -- when you say "a firm,"
15 are you referring to Integral?

16 A. Correct.

17 Q. Do you know how much Integral
18 has been paid for your work on this case?

19 A. I just stated that.

20 Q. Has -- so you said that you
21 billed about \$160,000; is that right?

22 A. Correct.

23 Q. Has all of that been paid to
24 date?

25 A. I couldn't tell you.

1 Q. Does your compensation depend
2 on the outcome of this court case?

3 A. No.

4 Q. Have you ever worked on a
5 groundwater flow or transport model that has
6 been used to estimate exposure in specific
7 individuals?

8 MS. BAUGHMAN: Objection.

9 Form.

10 THE WITNESS: My answer would
11 be that I would say I don't know if
12 that -- if that was how it was used.

13 Q. BY MS. SILVERSTEIN: So you're
14 not aware of any time that a flow or --
15 groundwater flow or transport model you've
16 worked on has been used to estimate exposure
17 in specific individuals; is that fair to say?

18 A. Yes.

19 Q. I'm handing you exhibit -- I
20 think we're on 4.

21 A. Four?

22 (Exhibit 4 was marked for identification.)

23 Q. BY MS. SILVERSTEIN: Handed you
24 Exhibit 4. This was attached to your initial
25 report as Exhibit 1 and is titled "Resum? for

1 R. Jeffrey Davis."

2 Is this a copy of your resum??

3 A. Yes.

4 Q. And does it appear to be a fair
5 and accurate copy?

6 A. Yes.

7 Q. Looking through your resum?, is
8 there anything that you want to change or
9 add?

10 A. No.

11 Q. If anything comes to mind that
12 you've worked on or have experience in that
13 isn't in your resum?, please let me know.

14 A. Okay.

15 Q. And you received your
16 bachelor's degree and master's degree in
17 civil and environmental engineering from BYU;
18 is that right?

19 A. Correct.

20 Q. Did you pursue or obtain any
21 education beyond your master's degree?

22 A. Yes. I was working on my PhD
23 before I left to go form a consulting
24 company.

25 Q. When was -- when were you

1 working on your PhD?

2 A. In the '90s.

3 Q. And what was your PhD for?

4 A. Civil and environmental
5 engineering.

6 Q. Was that also at BYU?

7 A. Correct.

8 Q. And why did you leave the PhD
9 program?

10 A. I had the opportunity to run a
11 consulting company.

12 Q. Was that a program that was
13 joint with the master's degree you received
14 or was that separate?

15 MS. BAUGHMAN: Objection.
16 Form.

17 THE WITNESS: I suppose it was
18 separate.

19 Q. BY MS. SILVERSTEIN: And by
20 "separate," I mean, did you apply for and
21 obtain your master's and then apply for and
22 start your PhD, or did you start it as one
23 program?

24 A. I started it as one.

25 Q. Did you have a specific

1 concentration in your master's program?

2 A. It was all primarily
3 groundwater-related.

4 Q. When you say
5 "groundwater-related," could you describe
6 what that means.

7 A. Hydrogeology, groundwater
8 principles, groundwater modeling, subsurface
9 characterization.

10 Q. So then it sounds like you
11 would have taken classes specific to
12 groundwater modeling?

13 A. Correct.

14 Q. Have you taken any, like,
15 continuing education courses or seminars
16 about groundwater modeling since finishing
17 your degree?

18 A. No. But I've taught hundreds
19 of courses in groundwater modeling across the
20 world.

21 Q. Would it be fair to say that
22 you consider yourself an expert in
23 groundwater modeling?

24 A. Yes.

25 Q. Do you consider yourself an

1 expert in any other field?

2 MS. BAUGHMAN: Objection to
3 form.

4 THE WITNESS: Other than civil
5 environmental engineering and
6 hydrogeology, no.

7 Q. BY MS. SILVERSTEIN: Is your
8 expertise in hydrogeology, is that based on
9 the same education as your expertise in
10 groundwater modeling?

11 A. Correct.

12 Q. Would it be -- so you
13 wouldn't -- you're not a toxicologist; right?

14 A. No.

15 Q. So you don't consider yourself
16 an expert in toxicology?

17 A. No.

18 Q. And you're not an
19 epidemiologist?

20 A. No.

21 Q. I want to go ahead and turn to
22 Page 5 of your resum?. There's a heading at
23 the top of that page that says "Groundwater
24 modeling."

25 Do you see where?

1 A. Yes.

2 Q. Are these all of the
3 groundwater modeling projects that you've
4 worked on?

5 A. No.

6 Q. How many groundwater projects
7 have you worked -- groundwater modeling
8 projects have you worked on that are not
9 included?

10 A. Hundreds.

11 Q. When was the earliest
12 groundwater modeling project that you worked
13 on?

14 A. Probably in the early '90s.

15 Q. Would that have been while you
16 were pursuing your education?

17 A. And while I was a full-time
18 employee.

19 Q. Employee where?

20 A. At Brigham Young University.

21 Q. Okay. Are any of these
22 groundwater modeling projects listed on your
23 resum? hindcasting projects?

24 A. Yes. I would say the second
25 one is.

1 Q. Okay.

2 A. The crop production services
3 would be. And -- yeah. Those two for sure.

4 Q. Okay. I want to talk about the
5 groundwater modeling -- the groundwater model
6 development New Jersey project.

7 When you say that that was a
8 hindcasting project, what do you mean by
9 "hindcasting"?

10 A. We built a model to try to
11 understand where the source of contamination
12 started and -- and how -- how it would have
13 moved through the ground in the past.

14 Q. Okay. What kind of -- how long
15 of a time period did you look at for that
16 project?

17 A. 50 years.

18 Q. Okay. And when -- if, you
19 know, the earliest day is year one and the
20 latest date that you're looking at closest to
21 the present is year 50, when did you first
22 have data?

23 MS. BAUGHMAN: Objection.

24 Form.

25 THE WITNESS: I don't recall.

1 Q. BY MS. SILVERSTEIN: Did you
2 have data for the earliest year that you
3 looked at?

4 MS. BAUGHMAN: Objection.
5 Form.

6 What kind of data are you
7 referring to?

8 MS. SILVERSTEIN: Any data.

9 Q. Did you have any data from the
10 earliest point you were looking at?

11 A. Limited.

12 Q. When you say "limited," what do
13 you mean?

14 A. More than one, less -- I -- you
15 know, limited data.

16 Q. Was that concentration data?

17 A. I don't believe so.

18 Q. What was the earliest point in
19 that hindcasting project that you worked on
20 that you had concentration data for?

21 A. I don't recall.

22 Q. Did you have well pumping data
23 from the first year that you modeled?

24 A. No.

25 Q. Did you have flow data for the

1 first year that you modeled?

2 A. Limited.

3 Q. When you say "limited," do you
4 mean just a few data points?

5 A. Actually, I -- I would ask a
6 question. What do you mean by "flow data"?

7 Q. So if I say "flow data," do
8 you -- how would you understand that?

9 MS. BAUGHMAN: Objection.

10 Form.

11 I think he just said he doesn't
12 understand it.

13 THE WITNESS: Yeah, I'm not
14 sure --

15 Q. BY MS. SILVERSTEIN: Did you
16 have data about the level of the water that
17 you were modeling?

18 A. Water levels. You asked that
19 question and I said that was limited.

20 Q. Okay. Did you have data about
21 which wells were pumping at the time?

22 A. Limited.

23 Q. When you say "limited," do you
24 mean limited in the number of data points?

25 A. Yes.

1 Q. Was that New Jersey hindcasting
2 model, was that contaminant fate and
3 transport?

4 A. Correct.

5 Q. Was it for a water distribution
6 system?

7 A. I'm not sure what you mean.

8 Q. What kind of water system were
9 you modeling?

10 MS. BAUGHMAN: Objection.

11 Form.

12 THE WITNESS: Groundwater.

13 Q. BY MS. SILVERSTEIN: Okay. And
14 so is that -- was that a water system that
15 was being used to provide drinking water, for
16 example?

17 A. Yes.

18 Q. What were the results of
19 that -- of your modeling used for?

20 MS. BAUGHMAN: Objection.

21 Form.

22 THE WITNESS: I probably can't
23 say.

24 Q. BY MS. SILVERSTEIN: Were they
25 used to estimate exposure in a specific

1 individual?

2 MS. BAUGHMAN: Objection.

3 Form.

4 THE WITNESS: I couldn't say.

5 Q. BY MS. SILVERSTEIN: And when
6 you say you can't say, is that because you
7 don't know?

8 A. No.

9 MS. BAUGHMAN: Is it because
10 it's confidential?

11 THE WITNESS: Yeah, it's
12 confidential.

13 Q. BY MS. SILVERSTEIN: Okay.
14 Okay. The other -- well, why is it
15 confidential?

16 A. Well, it's my understanding
17 that the case was settled last year, but it
18 is pretty new, and so I'm not sure that I'm
19 at liberty to say much about the case still
20 at this point.

21 Q. Have you been told by whoever
22 you were working for in that case that it was
23 confidential?

24 A. Yes.

25 Q. Did you write a report in that

1 case?

2 A. No.

3 Q. What kind of work product did
4 you prepare in that case?

5 A. To this point, just figures.

6 Q. Okay. And -- okay. And do you
7 know what those figures were used for?

8 A. No.

9 Q. The other project listed on
10 your resum? that you said was hindcasting is
11 crop production services, various locations
12 U.S.; is that correct?

13 A. Correct.

14 Q. And why do you describe that as
15 hindcasting?

16 A. We -- I was building models to
17 go back in time to understand nitrate
18 contamination at a number of sites across the
19 country.

20 Q. Okay. And when you were
21 building models back in time, how long of a
22 time period were you looking at?

23 A. It varied. 10, 20, 30, 40,
24 50 years.

25 Q. Okay. And did you have nitrate

1 concentration data that you used in that
2 project?

3 A. Usually not.

4 Q. Did you have well pumping data
5 that you used in that project?

6 A. Limited.

7 Q. What kind of -- well, and you
8 said in various locations. How many
9 locations did you model?

10 A. I'd say a dozen, maybe more.

11 Q. And what region were those?

12 A. Across the country.

13 Q. So would that be, you know,
14 desert, mountains?

15 A. Correct.

16 Q. Okay.

17 A. All -- all sorts of places.

18 Q. Okay. How -- what geographic
19 size were these locations?

20 A. They were pretty small.

21 Q. What do you mean by "pretty
22 small"?

23 A. Maybe a few square miles.

24 Q. Was this where -- the crop
25 production services, was that related to a

1 court case?

2 A. I -- I don't know.

3 Q. Do you know what the results of
4 that modeling were used for?

5 A. No.

6 MS. BAUGHMAN: Objection to
7 form.

8 THE WITNESS: No.

9 Q. BY MS. SILVERSTEIN: For the
10 hindcasting project in New Jersey, did you do
11 a sensitivity analysis?

12 A. Yes.

13 Q. What -- how did you do a
14 sensitivity analysis?

15 A. We looked at ranges of the
16 different parameters that we felt were going
17 to influence the model, and we looked at
18 different ranges and ran the model for those
19 ranges to look and see how sensitive that
20 particular parameter was.

21 Q. And did you do an uncertainty
22 analysis?

23 A. No.

24 Q. For the crop production
25 services work that you did, did you do a

1 sensitivity analysis?

2 A. Very limited.

3 Q. What do you mean by "very
4 limited"?

5 A. Maybe looking at one parameter
6 or two parameters.

7 Q. Okay. For the crop production
8 services work, did you do an uncertainty
9 analysis?

10 A. No.

11 MS. SILVERSTEIN: Okay. We've
12 been going for about an hour, so I
13 think this would be a good time for a
14 break.

15 THE WITNESS: Sure.

16 THE VIDEOGRAPHER: We're off
17 record. The time is 10:15.

18 (There was a break taken.)

19 THE VIDEOGRAPHER: We're back
20 on the record. The time is 10:29.
21 This is Media Number 2.

22 Counsel may proceed.

23 Q. BY MS. SILVERSTEIN: Mr. Davis,
24 we talked a lot about some of the work that
25 you've done for litigation regarding

1 groundwater modeling.

2 Have you been involved in
3 litigation in any way other than related to
4 groundwater modeling?

5 A. No.

6 Q. Have you ever been involved in
7 personal litigation?

8 A. Does a divorce count? Yes.

9 Q. Aside from a divorce, have you
10 been involved in any personal litigation?

11 A. No.

12 Q. I want to talk about the ATSDR
13 water modeling reports.

14 A. Okay.

15 Q. You reviewed the ATSDR Tarawa
16 Terrace reports?

17 A. Yes.

18 Q. And my understanding is that
19 you reviewed Chapters A, C, and F for Tarawa
20 Terrace; is that correct?

21 A. That sounds correct.

22 Q. Did you review any other Tarawa
23 Terrace chapters?

24 A. To the best of my knowledge,
25 no.

1 Q. Did you review any of the
2 Hadnot Point/Holcomb Boulevard chapters?

3 A. No.

4 Q. And just to be clear, you
5 aren't offering any opinions about the Hadnot
6 Point/Holcomb Boulevard model; is that
7 correct?

8 A. Correct.

9 Q. Why did you not perform a
10 post-audit for the Hadnot Point/Holcomb
11 Boulevard model?

12 MS. BAUGHMAN: Objection.
13 Form.

14 THE WITNESS: We weren't asked
15 to.

16 MS. SILVERSTEIN: I'm handing
17 you Exhibit 5.

18 (Exhibit 5 was marked for identification.)

19 Q. BY MS. SILVERSTEIN: Exhibit 5
20 is titled "Analyses of Groundwater Flow,
21 Contaminant Fate and Transport and
22 Distribution of Drinking Water At Tarawa
23 Terrace and Vicinity, U.S. Marine Corps Base
24 Camp Lejeune, North Carolina: Historical
25 Reconstruction and Present-Day Conditions.

1 Chapter A: Summary of Findings"; is that
2 correct?

3 A. Yes.

4 Q. And you said you reviewed this
5 in preparing your report?

6 A. Yes.

7 Q. If you could turn to the
8 page that is Roman Numeral iii with three
9 little i's, it says "Foreword." The Bates
10 stamp on the bottom ends in 642. It's right
11 at the front.

12 A. 642, 644. 642, okay.

13 Q. And do you see where it says
14 "Foreword" at the top?

15 A. Uh-huh.

16 Q. In the first paragraph here it
17 says "The Agency for Toxic Substances and
18 Disease Registry (ATSDR), an agency of the
19 U.S. Department of Health and Human Services,
20 is conducting an epidemiological study to
21 evaluate whether in utero and infant (up to
22 one year of age) exposures to volatile
23 organic compounds in contaminated drinking
24 water at U.S. Marine Corps Base Camp Lejeune,
25 North Carolina, were associated with specific

1 birth defects and childhood cancers. The
2 study includes births occurring during the
3 period 1968 to 1985 to women who were
4 pregnant while they resided in family housing
5 at the base. During 2004, the study protocol
6 received approval from the Centers for
7 Disease Control and Prevention Institutional
8 Review Board and the U.S. Office of
9 Management and Budget."

10 Did I read that correctly?

11 A. Yes.

12 Q. And then the next paragraph
13 says "Historical exposure data needed for the
14 epidemiological case-control study are
15 limited. To obtain estimates of historical
16 exposure, ATSDR is using water-modeling
17 techniques and the process of historical
18 reconstruction. These methods are used to
19 quantify concentrations of particular
20 contaminants and finished water and to
21 compute the level and duration of human
22 exposure to contaminated drinking water."

23 Did I read that correctly?

24 A. Yes.

25 Q. When you conducted your

1 post-audit on the Tarawa Terrace model, you
2 were aware that AT -- that the ATSDR model
3 was not intended to estimate exposures to
4 individuals so that the individual could
5 determine whether an estimated exposure
6 caused his or her health concern?

7 MS. BAUGHMAN: Objection. Form
8 and foundation.

9 THE WITNESS: Can you repeat
10 the question again?

11 Q. BY MS. SILVERSTEIN: Sure.

12 When you conducted the
13 post-audit on Tarawa Terrace, you were aware
14 that the ATSDR model was not intended to
15 estimate exposures to individuals, that
16 the -- the individual could determine whether
17 an estimated exposure caused his or her
18 health condition?

19 MS. BAUGHMAN: Objection; form.
20 Objection; Foundation.

21 THE WITNESS: I wasn't aware of
22 either, either way.

23 Q. BY MS. SILVERSTEIN: Were you
24 aware of what the purpose of the ATSDR water
25 model for the Tarawa Terrace drinking water

1 system was intended for?

2 MS. BAUGHMAN: Objection. Form
3 and foundation.

4 THE WITNESS: Only to the
5 extent of what it was written.

6 Q. BY MS. SILVERSTEIN: Okay. So
7 if it was -- if what it was intended for was
8 written in the ATSDR report, you were aware
9 of that?

10 A. Correct.

11 Q. Do you -- is it important to
12 understand the purpose of a model before you
13 create the model?

14 MS. BAUGHMAN: Objection.
15 Form.

16 THE WITNESS: Yes.

17 Q. BY MS. SILVERSTEIN: Why?

18 A. That's -- in my experience,
19 that's the foundation for building a model,
20 especially in a groundwater model, is how
21 it's going to be used.

22 Q. When you are working on a
23 post-audit, is it important to understand the
24 purpose of the model that you are doing a
25 post-audit of?

1 MS. BAUGHMAN: Objection.

2 Form.

3 THE WITNESS: Sure.

4 Q. BY MS. SILVERSTEIN: When you
5 were working on the post-audit for the Tarawa
6 Terrace drinking water system, did you
7 consider the Navy's criticism on the ATSDR
8 model in forming your opinion?

9 MS. BAUGHMAN: Objection.

10 Form.

11 THE WITNESS: I wasn't aware of
12 the Navy's criticism.

13 Q. BY MS. SILVERSTEIN: So then
14 were you aware of Mr. Maslia's response to
15 the Navy criticism?

16 MS. BAUGHMAN: Objection.

17 Form.

18 THE WITNESS: No.

19 Q. BY MS. SILVERSTEIN: Morris
20 Maslia is the lead of the ATSDR water
21 modeling effort at Camp Lejeune; is that
22 correct?

23 MS. BAUGHMAN: Objection to
24 form. Foundation.

25 THE WITNESS: It's my

1 understanding, yes.

2 Q. BY MS. SILVERSTEIN: And you're
3 aware that Mr. Maslia is serving as an expert
4 for the plaintiffs in this litigation?

5 A. Yes.

6 MS. SILVERSTEIN: I'm handing
7 you Exhibit 6.

8 (Exhibit 6 was marked for identification.)

9 Q. BY MS. SILVERSTEIN: This is --
10 Exhibit 6 is titled "Analyses of Groundwater
11 Flow, Contaminant Fate and Transport and
12 Distribution of Drinking Water at Tarawa
13 Terrace and Vicinity, U.S. Marine Corps Base
14 Camp Lejeune, North Carolina: Historical
15 Reconstruction and Present-Day Conditions.
16 Response to the Department of the Navy's
17 Letter on Assessment of ATSDR Water Modeling
18 for Tarawa Terrace."

19 Have you seen this document
20 before?

21 A. I don't believe so.

22 Q. Were you aware when you
23 conducted your post-audit that Morris Maslia
24 stated "A successful epidemiological study
25 places little emphasis on the actual absolute

1 estimate of concentration and, rather,
2 emphasizes the relative level of exposure"?

3 MS. BAUGHMAN: Objection. Form
4 and foundation.

5 What are you reading from? You
6 need to show him the document.

7 THE WITNESS: Yeah, I don't
8 know if --

9 Q. BY MS. SILVERSTEIN: Had you
10 read any statement like that from Mr. Maslia
11 when you prepared your report?

12 MS. BAUGHMAN: Same objections.

13 THE WITNESS: No.

14 Q. BY MS. SILVERSTEIN: In your
15 report regarding the Tarawa Terrace model,
16 you opined that the model used sound
17 methodology and provided reliable insights to
18 the migration of PCE contamination; is that
19 correct?

20 A. Yes.

21 Q. Are you opining that the model
22 reliably or accurately estimates monthly
23 contaminant concentration levels for
24 individuals?

25 MS. BAUGHMAN: Objection.

1 Form.

2 THE WITNESS: No.

3 Q. BY MS. SILVERSTEIN: You opined
4 that the post-audit found that the original
5 Tarawa Terrace groundwater flow --
6 groundwater flow and transport models were
7 developed using sound methodology. Sorry.

8 You opine that the model
9 effectively simulates long-term trends and
10 contaminant migration; is that correct?

11 A. Yes.

12 Q. And that you can find no
13 significant evidence that would invalidate
14 the analyses performed by ATSDR with the
15 original model; right?

16 A. Yes.

17 Q. If you could turn to in
18 Exhibit 6 the Bates ending in 33272.

19 A. What page?

20 Q. Do you see the Bates numbers on
21 the bottom?

22 A. Yeah.

23 Q. It ends in 33 -- oh, sorry --
24 33272.

25 A. 272. Okay.

1 Q. And I want to direct you to the
2 last paragraph --

3 A. Okay.

4 Q. -- on that page.

5 It says "To address the issue
6 of the intended use of the water-modeling
7 results by the current ATSDR epidemiological
8 study, the DON should be advised that a
9 successful epidemiological study places
10 little emphasis on the actual (absolute)
11 estimate of concentration and, rather,
12 emphasizes the relative level of exposure.
13 That is, exposed individuals are, in effect,
14 ranked by exposure level and maintain their
15 rank order of exposure level regardless of
16 how far off the estimated concentration is to
17 the 'true' (measured) PCE concentration.
18 This rank order of exposure level is
19 preserved regardless of whether the mean or
20 the upper or lower 95 percent of simulated
21 levels are used to estimate the monthly
22 average contaminant levels. It is not the
23 goal of the ATSDR health study to infer which
24 health effects occur at specific PCE
25 concentrations - that is a task for risk

1 assessment utilizing approaches such as
2 meta-analysis to summarize evidence from
3 several epidemiological studies because a
4 single epidemiological study is generally
5 insufficient to make this determination."

6 Did I read that correctly?

7 A. Yes.

8 Q. And did you consider that
9 response, that paragraph, when you were
10 preparing your report?

11 MS. BAUGHMAN: Objection. Form
12 and foundation.

13 He -- he already said he hasn't
14 read the document.

15 THE WITNESS: Yeah, that's
16 correct. I -- this is the first time
17 reading this, so the answer would be
18 no.

19 Q. BY MS. SILVERSTEIN: Okay. And
20 you aren't opining that the model can be used
21 to estimate exposure caused by -- exposure --
22 whether a specific exposure caused an
23 individual's health condition; right?

24 MS. BAUGHMAN: Objection. Form
25 and foundation.

1 THE WITNESS: They're not my
2 area of expertise.

3 Q. BY MS. SILVERSTEIN: And is it
4 your understanding that the model was used --
5 was intended to be used for an
6 epidemiological study?

7 MS. BAUGHMAN: Objection. Form
8 and foundation.

9 THE WITNESS: Based on what I
10 have read in the reports, that's what
11 it says.

12 Q. BY MS. SILVERSTEIN: Okay. I
13 want to direct you back to Exhibit 5, which
14 is Chapter A. And if you could turn to
15 Page A-98, which is the Bates stamp ending
16 15749.

17 A. 5749. Okay.

18 Q. And if you could look at the
19 fourth paragraph down, it says "ATSDR's
20 exposure assessment cannot be used to
21 determine whether you, or your family,
22 suffered any health effects as the result of
23 past exposure to PCE-contaminated drinking
24 water at Camp Lejeune."

25 Do you see that?

1 A. Yep.

2 Q. Do you agree that ATSDR's
3 exposure assessment cannot be used to
4 determine whether a person suffered any
5 health effects as a result of the past
6 exposure?

7 MS. BAUGHMAN: Objection. Form
8 and foundation.

9 THE WITNESS: It's not my area
10 of expertise.

11 Q. BY MS. SILVERSTEIN: If you
12 would look at Page A67. And that has the
13 Bates ending in 5718.

14 A. Uh-huh.

15 Q. Would you agree that the Tarawa
16 Terrace drinking water system's largest
17 contaminant was PCE?

18 MS. BAUGHMAN: Objection.
19 Form. Foundation.

20 THE WITNESS: That's my
21 understanding.

22 Q. BY MS. SILVERSTEIN: And is it
23 your understanding that the PCE came from
24 ABC One-Hour Cleaners?

25 A. That's my understanding.

1 Q. And you agree that ATSDR did
2 not simulate benzene concentrations at Tarawa
3 Terrace; right?

4 MS. BAUGHMAN: Objection. Form
5 and foundation.

6 THE WITNESS: That's my
7 understanding.

8 Q. BY MS. SILVERSTEIN: In your
9 post-audit, you also didn't look at whether
10 any benzene concentrations were reliably
11 simulated by ATSDR's model; right?

12 A. Correct.

13 Q. Your post-audit only looked at
14 PCE; right?

15 A. Correct.

16 Q. It didn't evaluate PCE
17 byproducts, did it?

18 A. Correct.

19 Q. I want to go to Page A17.

20 Would it be accurate to say
21 that the Tarawa Terrace drinking water supply
22 from 1953 to 1985 consisted of water supplied
23 from the groundwater wells to the Tarawa
24 Terrace water treatment plant and delivery of
25 finished water from the water treatment plant

1 through the Tarawa Terrace water distribution
2 system storage tanks and piping network?

3 MS. BAUGHMAN: Objection.

4 Form.

5 Are you reading from the
6 document?

7 MS. SILVERSTEIN: I'm asking
8 him a question, if his understanding
9 is that the Tarawa Terrace's drinking
10 water supply from 1953 to 1985
11 consisted of water supplied from
12 groundwater wells to the Tarawa
13 Terrace water treatment plant and
14 delivery of finished water from the
15 water treatment plant through the
16 Tarawa Terrace water distribution
17 system's storage tanks and piping
18 network.

19 Q. Is that your understanding?

20 A. Yes.

21 Q. Would you agree that the
22 groundwater wells in the Tarawa Terrace area
23 supplied untreated water to a central
24 treatment facility?

25 A. That's my understanding.

1 Q. Okay. And you would agree that
2 the dates when those started and stopped
3 supplying water are important to
4 historical -- the historical concentrations
5 in the water delivered from the Tarawa
6 Terrace water treatment plant?

7 MS. BAUGHMAN: Objection.
8 Form.

9 THE WITNESS: Can you ask that
10 question again?

11 Q. BY MS. SILVERSTEIN: Sure.
12 When you were looking to
13 determine what the historical concentrations
14 in water delivered from the Tarawa Terrace --
15 delivered -- yeah, delivered from the Tarawa
16 Terrace water treatment plant, it is critical
17 to know when wells started and stopped
18 supplying water; is that right?

19 MS. BAUGHMAN: Objection.
20 Form.

21 THE WITNESS: That -- that
22 information would be helpful.

23 Q. BY MS. SILVERSTEIN: Because
24 that will tell you -- that will help tell you
25 how the contaminants were moving?

1 MS. BAUGHMAN: Objection.

2 Form.

3 THE WITNESS: How they're
4 moving? In the groundwater?

5 Q. BY MS. SILVERSTEIN: Why would
6 that information be helpful?

7 A. It's my understanding that the
8 wells that were pumping from the ground were
9 delivering water to the treatment plant.

10 Q. And, similarly, wells that were
11 not pumping were not delivering water to the
12 water treatment plant?

13 A. Yeah, that would be physically
14 impossible.

15 Q. And so to understand what
16 historical concentration is, it's important
17 to know which wells were pumping; right?

18 MS. BAUGHMAN: Objection.

19 Form.

20 THE WITNESS: Sometimes you
21 don't know that information, so you
22 have to make assumptions.

23 Q. BY MS. SILVERSTEIN: Do the
24 wells impact the groundwater flow?

25 MS. BAUGHMAN: Objection.

1 Form.

2 THE WITNESS: Yes.

3 Q. BY MS. SILVERSTEIN: And if you
4 don't know that information, you're making
5 assumptions you said?

6 MS. BAUGHMAN: Objection.

7 Form.

8 THE WITNESS: Yes.

9 Q. BY MS. SILVERSTEIN: But those
10 assumptions are not -- it's possible that
11 those assumptions are not accurate; right?

12 MS. BAUGHMAN: Objection.

13 Form.

14 THE WITNESS: It's possible.

15 Q. BY MS. SILVERSTEIN: If you
16 turn to Page A19. Do you see Table A6?

17 A. Yes.

18 Q. And that is titled "Historical
19 operations for" -- Camp Lejeune -- "for water
20 supply wells, 1952 to 1987, Tarawa Terrace
21 and Vicinity, U.S. Marine Corps Base Camp
22 Lejeune, North Carolina"; right?

23 A. Yes.

24 Q. And you'd agree that this is --
25 this is all of the water supply wells that

1 served Tarawa Terrace?

2 A. I assume so.

3 Q. You're not aware of any water
4 supply wells that served Tarawa Terrace that
5 are not included in this table; correct?

6 A. Correct.

7 Q. If you look at TT-23?

8 A. Uh-huh.

9 Q. You'd agree that TT-23 was
10 first in service in August 1984; right?

11 A. That's what it says.

12 Q. And that it was offline in
13 February 1985; right?

14 A. That -- that's what it says.

15 Q. And you'd agree that TT-23, the
16 service was terminated in May 1985?

17 A. I have no other information
18 by -- except for what's presented.

19 Q. Okay. So based on what's
20 presented, you would agree that TT-23's
21 service was terminated in May 1985; correct?

22 A. Correct.

23 Q. And if you look at TT-25, you
24 would agree that TT-25 was first in service
25 in January 1982?

1 A. That's what it says.

2 Q. And that TT-25 service was
3 terminated in March 1987; correct?

4 A. As stated.

5 Q. You would also agree that TT-26
6 was offline July through August 1980 and
7 January through February 1983?

8 A. As it's recorded.

9 Q. And you would agree that TT-26
10 service was terminated in February 1985?

11 A. As stated.

12 MS. SILVERSTEIN: I'm handing
13 you Exhibit 7.

14 (Exhibit 7 was marked for identification.)

15 Q. BY MS. SILVERSTEIN: I handed
16 you Exhibit 7. The title here is "Analyses
17 of Groundwater Flow, Contaminant Fate and
18 Transport, and Distribution of Drinking Water
19 at Tarawa Terrace and Vicinity, U.S. Marine
20 Corps Base Camp Lejeune, North Carolina:
21 Historical Reconstruction and Present-Day
22 Conditions. Chapter C: Simulation of
23 Groundwater Flow"; is that correct?

24 A. Correct.

25 Q. Okay. And you see in the

1 bottom corner -- right-hand corner on the
2 first page the Bates is ending in 92939?

3 A. Correct.

4 Q. And this is -- you reviewed
5 Chapter C in forming your opinions; right?

6 A. Yes.

7 Q. If you could turn to Page C25.
8 It's -- the Bates ends in 92975.

9 Do you see --

10 A. Yes.

11 Q. -- that? And you see
12 Table C10?

13 A. Uh-huh, yes.

14 Q. Table C10 is titled "Simulated
15 and observed predevelopment water levels in
16 wells and related statistics, Tarawa Terrace
17 and vicinity, U.S. Marine Corps Base
18 Camp Lejeune, North Carolina"; right?

19 A. Yes.

20 Q. And you agree that this is --
21 this is ATSDR's table on the capacity and
22 operational history of the listed wells?

23 MS. BAUGHMAN: Objection.

24 Form.

25 THE WITNESS: Capacity and

1 operation?

2 Q. BY MS. SILVERSTEIN: What is
3 your understanding of what this table is?

4 A. To me, it looks like you have a
5 bunch of sites where you're measuring the
6 water level and simulating it, I assume, with
7 the groundwater model.

8 Q. Okay. Do you agree -- all
9 right. So I want you to look at both
10 Table A6 and Table C10.

11 Do you have both of those
12 tables?

13 A. A6?

14 Q. Yes.

15 A. Okay. Hold on one second.

16 MS. BAUGHMAN: What page was A6
17 on?

18 THE WITNESS: It would be on
19 page...

20 MS. SILVERSTEIN: It's A19.

21 THE WITNESS: Okay. Okay.

22 Q. BY MS. SILVERSTEIN: I actually
23 pointed you to the wrong table in Chapter C.

24 A. No worries.

25 Q. So Table -- Ah. Is it your

1 understanding that the service termination
2 dates between Chapter C and Chapter A should
3 be the same?

4 MS. BAUGHMAN: Objection.

5 Form.

6 THE WITNESS: I'm not sure what
7 tables you're referring to.

8 Q. BY MS. SILVERSTEIN: So we just
9 looked at Table A6, which says when TT-23
10 service was terminated; correct?

11 A. A6, yep.

12 Q. Okay.

13 A. That's correct.

14 Q. And in your experience, should
15 the service termination date be consistent
16 in -- across ATSDR's reports?

17 MS. BAUGHMAN: Objection.

18 Form. Foundation.

19 THE WITNESS: I assume.

20 Q. BY MS. SILVERSTEIN: If you go
21 to Page A27 and look at Table A9?

22 MS. BAUGHMAN: When -- which --
23 which document?

24 THE WITNESS: A -- Chapter A.

25 MS. BAUGHMAN: Okay.

1 THE WITNESS: A -- what table?

2 MS. SILVERSTEIN: A27. It's
3 Table A9.

4 THE WITNESS: Okay.

5 Q. BY MS. SILVERSTEIN: And this
6 is titled "Summary of model-derived values
7 and observed data of tetrachloroethylene at
8 water-supply wells, Tarawa Terrace, U.S.
9 Marine Corps Base Camp Lejeune,
10 North Carolina"; correct?

11 A. Yes.

12 Q. And would it be fair to say
13 that Table A9 summarizes paired, observed,
14 and model-simulated values of PCE at the
15 Tarawa Terrace water supply wells?

16 A. Yes. Model-derived values and
17 observed values, correct.

18 Q. Would you agree that from
19 January 1952 to December 1987, PCE was only
20 detected in TT-26, TT-23, and TT-25?

21 MS. BAUGHMAN: Objection.
22 Form.

23 THE WITNESS: In which wells?
24 26.

25 Q. BY MS. SILVERSTEIN: 23 --

1 TT-23, TT-25, and TT-26.

2 A. What about TT-31? Or TT-54?

3 Q. Do you see Supply Well TT-31
4 under the observed data?

5 A. Oh, not -- okay, nondetected.

6 Q. It's marked as nondetect;
7 correct?

8 A. Okay. Yeah, based on -- oh,
9 until '87; right?

10 Q. From 195' -- January 1952 to
11 December 1987, PCE was detected only in
12 TT-23, TT-25, and TT-26; correct?

13 A. According to this table, that
14 is correct.

15 Q. Are you aware of data showing
16 that PCE was detected at any well other than
17 TT-23, TT-25, or TT-26 from January 1952 to
18 December 1987?

19 A. No.

20 Q. And you'd agree that the
21 highest PCE detection in TT-23 was
22 132 micrograms per liter in January 1985;
23 correct?

24 A. Based on this table, correct.

25 Q. And you'd agree that PCE

1 detection -- that the only PCE detection in
2 TT-25 was .43 micrograms per liter in
3 September 1985?

4 MS. BAUGHMAN: Objection.

5 Form.

6 THE WITNESS: That's what it
7 says.

8 Q. BY MS. SILVERSTEIN: Okay. Do
9 you have any reason to believe that there is
10 other data not included in --

11 A. No.

12 MS. BAUGHMAN: Objection.

13 Form. Foundation.

14 Were you limiting that to
15 through 1987?

16 THE WITNESS: Yeah.

17 MS. SILVERSTEIN: Yes.

18 MS. BAUGHMAN: Okay. I just
19 didn't hear you say that.

20 Q. BY MS. SILVERSTEIN: And you'd
21 agree that the September 1985 results were
22 after nondetects in both February 1985 and
23 April 1985; correct?

24 A. Okay. Say -- ask -- can you
25 ask that question again?

1 Q. Oh, you said a minute ago that
2 the -- that you agreed that the only PCE
3 detection from January 1952 to December 1987
4 in Supply Well TT-25 was .43 micrograms per
5 liter in September 1985; right?

6 A. Yes.

7 Q. And you would agree that that
8 test result came after nondetects in both
9 February 1985 and April 1985?

10 A. Based on this table, yes.

11 Q. And you agree that TT-26 was
12 the primary contributor of PCE contamination
13 to the Tarawa Terrace water treatment plant?

14 A. Yes.

15 Q. You agree that the PCE
16 concentration and the water distributed from
17 the Tarawa Terrace water treatment plant had
18 PCE concentrations lower than detected at
19 TT-26; right?

20 MS. BAUGHMAN: Objection.

21 Form.

22 THE WITNESS: That's my
23 understanding.

24 Q. BY MS. SILVERSTEIN: And you'd
25 agree that when TT-26 shut down in

1 February 1985, PCE concentrations at the
2 Tarawa Terrace water treatment plant would
3 decrease?

4 MS. BAUGHMAN: Objection.

5 Form.

6 THE WITNESS: I don't -- I
7 don't know if you have enough basis
8 for that.

9 Q. BY MS. SILVERSTEIN: Okay. Do
10 you disagree that the PCE concentrations at
11 the Tarawa Terrace water treatment plant
12 would significantly decrease?

13 MS. BAUGHMAN: Objection.

14 Form.

15 THE WITNESS: You would -- you
16 would expect, but I don't know if you
17 can make that assumption.

18 Q. BY MS. SILVERSTEIN: You would
19 expect that they would decrease?

20 A. Yes.

21 Q. What information would you need
22 to be sure that the concentrations would
23 decrease?

24 MS. BAUGHMAN: Objection.

25 Form.

1 THE WITNESS: Measured values.

2 Q. BY MS. SILVERSTEIN: I want to
3 direct you to Page A18 with the Bates stamp
4 ending 615669. And in the first half of
5 those two sections of text at the bottom,
6 about three lines up it starts "Once a well
7 was put in service, it was assumed to operate
8 continuously for modeling purposes" and it
9 was -- "until it was permanently taken
10 offline - the exception being temporary
11 shutdowns for long-term maintenance. Breaks
12 in continuous operations, such as those for
13 Wells TT-26 and TT-53, are also shown in
14 Figure A5 and are based on documented
15 information detailing periods of maintenance
16 for specific wells."

17 Did I read that correctly?

18 A. Yes.

19 Q. So then it would be -- you
20 would agree that ATSDR model, the Tarawa
21 Terrace supply wells, by assuming the
22 operate -- they operated continuously unless
23 ATSDR found documentation that they were
24 temporarily shut down for maintenance?

25 A. That's my understanding.

1 Q. Okay. And you would agree that
2 TT-26 and TT-23 were not modeled as
3 contributing anything to the Tarawa Terrace
4 water treatment plant after 1985; right?

5 A. That's my understanding.

6 Q. Okay. So ATSDR's Tarawa
7 Terrace model is modeling contamination
8 coming from wells other than TT-26 and TT-23
9 after 1985?

10 MS. BAUGHMAN: Objection.

11 Form.

12 THE WITNESS: Can you repeat
13 the question?

14 Q. BY MS. SILVERSTEIN: Sure.

15 You would agree that ATSDR's
16 Tarawa Terrace model is modeling
17 contamination from wells other than TT-26 and
18 TT-23 after 1985; right?

19 A. Assuming that they're pumping,
20 yes.

21 Q. Assuming that what's pumping?

22 A. That the other wells are
23 pumping.

24 Q. Regardless of whether the other
25 wells are pumping, ATSDR was not modeling

1 contamination from TT-26 or TT-23 after 1985;
2 right?

3 MS. BAUGHMAN: Objection.

4 Form.

5 THE WITNESS: That's my
6 understanding.

7 Q. BY MS. SILVERSTEIN: So if
8 ATSDR is modeling water contamination after
9 1985, it would have to be from wells other
10 than TT-26 and TT-23?

11 A. Yeah, it -- yes.

12 Q. You would also agree that the
13 only other well where contamination was
14 detected from 1953 to 1987 was TT-25?

15 A. Yes, based on that table.

16 Q. Go to Page A93.

17 Okay. Do you see the table
18 here, "Appendix A2. Simulated
19 tetrachloroethylene and its degradation
20 byproducts in finished water, Tarawa Terrace
21 water treatment plant, January 1951 to
22 March 1987 and continued"; right?

23 A. Yes.

24 Q. You would agree that ATSDR
25 modeled PCE concentrations in water -- the

1 water treatment plant as high as
2 18 micrograms per liter; right?

3 MS. BAUGHMAN: Objection.
4 Form.

5 What time frame are you talking
6 about?

7 Q. BY MS. SILVERSTEIN: During the
8 modeled time period -- during the time period
9 through December 1987, you would agree that
10 ATSDR modeled PCE concentrations in the water
11 treatment plant in 1987 as high as
12 18 micrograms per liter?

13 MS. BAUGHMAN: Objection.
14 Form.

15 THE WITNESS: In 1987?

16 Q. BY MS. SILVERSTEIN: In 1987,
17 just looking at the 1987 data, you would
18 agree that ATSDR modeled PCE concentration in
19 water -- in the water treatment plant as high
20 as 18 micrograms per liter; right?

21 A. That -- that's what this table
22 says.

23 Q. And that was based on a mixture
24 of five wells?

25 MS. BAUGHMAN: Objection.

1 Form.

2 THE WITNESS: I would have to
3 go back and see, but I would -- I
4 would assume, yes.

5 Q. BY MS. SILVERSTEIN: In -- and
6 so that highest value in 1987 was
7 February 1987; right?

8 A. Correct.

9 Q. And it was 18.49 micrograms per
10 liter?

11 A. Correct.

12 Q. And you agree that in 1987, PCE
13 contamination was only found in TT-25?

14 MS. BAUGHMAN: Objection.

15 Form. Foundation.

16 THE WITNESS: Based on the
17 tables that are listed here, that's
18 correct.

19 Q. BY MS. SILVERSTEIN: And that
20 contamination was less than 1 microgram per
21 liter?

22 MS. BAUGHMAN: Objection.

23 Form.

24 THE WITNESS: Based on the
25 table that we looked at before.

1 Q. BY MS. SILVERSTEIN: And to
2 your knowledge, that table includes the only
3 sampling results from the Tarawa Terrace
4 water treatment plant?

5 A. Based --

6 MS. BAUGHMAN: Objection.

7 Form. Foundation.

8 THE WITNESS: Based on the
9 table, yes.

10 Q. BY MS. SILVERSTEIN: Based on
11 the table, it includes all of the results;
12 correct?

13 MS. BAUGHMAN: Objection.

14 Form.

15 THE WITNESS: Yes.

16 Q. BY MS. SILVERSTEIN: And you're
17 not aware of any sampling results that are
18 not included in that table?

19 A. I'm not aware, correct.

20 MS. SILVERSTEIN: I'm handing
21 you Exhibit 8.

22 (Exhibit 8 was marked for identification.)

23 Q. BY MS. SILVERSTEIN: This -- I
24 just handed you Exhibit 8. The title of
25 Exhibit 8 is "Analyses of Groundwater Flow,

1 Contaminant Fate and Transport, and
 2 Distribution of Drinking Water at Tarawa
 3 Terrace and Vicinity, U.S. Marine Corps Base
 4 Camp Lejeune, North Carolina: Historical
 5 Reconstruction and Present-Day Conditions.
 6 Chapter F: Simulation of the Fate and
 7 Transport of Tetrachloroethylene (PCE)";
 8 right?

9 A. Correct.

10 Q. And the Bates in the lower
 11 right-hand corner ends with 93047?

12 A. Correct.

13 Q. And you reviewed Chapter F in
 14 preparing your reports?

15 A. Correct.

16 Q. If you could turn to Page F42.
 17 And the Bates on that page, if it's helpful
 18 to find, ends in 93100.

19 A. Yep.

20 Q. At the top of the page it says
 21 "Level 4 Calibration."

22 Do you see where I'm looking?

23 A. Yes.

24 Q. And that -- that paragraph
 25 says -- or starts "The final stage of model

1 calibration employed a simple mixing
2 (flow-weighted average) model to" -- "to
3 compute PCE concentrations delivered to the
4 Tarawa Terrace water treatment plant from all
5 active water-supply wells and subsequently to
6 the Tarawa Terrace water-supply network. For
7 each stress period (month) of the simulation
8 period (from January 1951 to December 1994),
9 the PCE concentration simulated at each
10 active water-supply well is weighted by the
11 respective well discharge to compute a
12 weighted-average PCE concentration. This
13 weighted-average concentration was considered
14 the monthly average PCE concentration
15 delivered to the Tarawa Terrace water
16 treatment plant. The results" -- yeah --
17 "delivered to the Tarawa Terrace water
18 treatment plant."

19 Did I read that correctly?

20 A. Yes.

21 Q. Is it your understanding that a
22 well's discharge means the water coming out
23 of the well?

24 A. Yes.

25 Q. And that -- and is it your

1 understanding that simple mixing
2 flow-weighted average has no calculation
3 simulating the physical processes whereby
4 contaminants lost during storage treat- --
5 contaminants are lost during storage,
6 treatment, or distribution?

7 MS. BAUGHMAN: Objection.

8 Foundation. Form.

9 THE WITNESS: Correct.

10 Q. BY MS. SILVERSTEIN: And so you
11 would agree that a simple mixing
12 flow-weighted average doesn't include a
13 calculation for volatilization?

14 A. Yes.

15 Q. Or for sorption?

16 A. Adsorption on what?

17 Q. Does it include a calculation
18 for sorption?

19 MS. BAUGHMAN: Objection.

20 Form.

21 THE WITNESS: Sorption on what?

22 Q. BY MS. SILVERSTEIN: Of
23 anything.

24 Do -- does it include sorption
25 in the -- in the calculation?

1 MS. BAUGHMAN: Objection.

2 Form.

3 If it -- if it doesn't make
4 sense to you, you can tell her that.

5 THE WITNESS: Yeah, that
6 doesn't make sense.

7 Q. BY MS. SILVERSTEIN: Okay. And
8 you're not aware of any other processes
9 whereby contaminants are lost during storage,
10 treatment, or distribution that are taken
11 into account in the model; correct?

12 MS. BAUGHMAN: Objection.
13 Form.

14 THE WITNESS: No, I'm not
15 aware.

16 Q. BY MS. SILVERSTEIN: So it
17 would be correct to say that the ATSDR Tarawa
18 Terrace model did not include a calculation
19 simulating contaminant losses during storage,
20 treatment, or distribution?

21 A. That's my understanding.

22 Q. You would agree that the ATSDR
23 Tarawa Terrace model simulated PCE
24 concentrations as equivalent to the mixture
25 of water as if it was taken directly from the

1 wells without treatment or distribution?

2 MS. BAUGHMAN: Objection.

3 Form.

4 THE WITNESS: Can you repeat
5 that question?

6 Q. BY MS. SILVERSTEIN: Sure.

7 You would agree that the ATSDR
8 Tarawa Terrace model simulated PCE
9 concentrations as if they were equivalent to
10 the mixture of water taken directly from the
11 wells without treatment or distribution?

12 MS. BAUGHMAN: Objection.

13 Form.

14 THE WITNESS: The -- the model
15 simulated the extraction of the wells
16 of that water that was delivered to
17 the treatment plant. That's what the
18 model simulated.

19 Q. BY MS. SILVERSTEIN: Okay.
20 Okay. I want to go back to Chapter A. If
21 you go to -- go to Page A26.

22 And you see Table A8 at the
23 top?

24 A. Uh-huh, yes.

25 Q. And Table A8 is titled "Summary

1 of calibration targets and resulting
2 calibration statistics for simulation models
3 used to reconstruct historical contamination
4 events at Tarawa Terrace and vicinity, U.S.
5 Marine Corps Base Camp Lejeune,
6 North Carolina"; right?

7 A. Yes.

8 Q. And the second column is
9 "Analysis type"?

10 A. Yes.

11 Q. And as you look at Calibration
12 Level 3, it says the analysis type is
13 contaminant fate and transport supply wells;
14 right?

15 A. Yes.

16 Q. So you would agree that ATSDR
17 calibrated the contaminant fate and transport
18 at Tarawa Terrace with supply well
19 measurements; right?

20 A. Yes.

21 Q. And that was the -- well, you
22 would agree that the calibration target that
23 ATSDR used was plus or minus one-half order
24 of magnitude; right?

25 A. That's what it says.

1 Q. Okay. And so the model bias
2 was ranging from .3 -- they used a target of
3 ranging from .3 to 3?

4 A. Yes.

5 Q. So then if you look at
6 Chapter F on Page F33. Do you see Table F13
7 on the left-hand side?

8 A. Yes.

9 Q. That's the "Simulated and
10 observed tetrachloroethylene (PCE)
11 concentrations at water supply wells and
12 calibration target range, Tarawa Terrace and
13 Vicinity, U.S. Marine Corps Base
14 Camp Lejeune, North Carolina"; right?

15 A. Yes.

16 Q. And you'd agree that Table F13
17 shows all of the supply well observed
18 measurements that were used for calibration?

19 A. That's my understanding, yes.

20 Q. And you'd agree that the
21 observed measurements are from 1984 and 1985
22 and 1991?

23 A. '85, and '91. What was the
24 other year you said?

25 Q. 1984. Well, I guess you would

1 agree that the --

2 A. Where -- where do you see 1984?

3 Q. Sure.

4 You would agree that the
5 observed measurements listed in this chart
6 are from 1985 and 1991; right?

7 A. Based on this chart, yes.

8 Q. Which means the Tarawa Terrace
9 model was not calibrated with any observed
10 concentrations from 1953 to 1983, or 1984?

11 MS. BAUGHMAN: Objection. Form
12 and foundation.

13 THE WITNESS: That's my
14 understanding.

15 Q. BY MS. SILVERSTEIN: Okay. I
16 want to turn now to your initial report,
17 which I believe is Exhibit 2.

18 Do you have your report in
19 front of you?

20 A. Yes.

21 Q. And all of your opinions
22 related to Camp Lejeune are included in this
23 report?

24 MS. BAUGHMAN: Objection.

25 Form.

1 THE WITNESS: All of my
2 opinions? Well, the opinions based on
3 the work that we did, yes.

4 Q. BY MS. SILVERSTEIN: And you're
5 not offering any opinions that are not
6 included in this -- this report or your
7 rebuttal report; correct?

8 MS. BAUGHMAN: Objection.
9 Form.

10 THE WITNESS: That's correct.

11 Q. BY MS. SILVERSTEIN: If you
12 could look at section -- or at Page 6-1.

13 A. Which page?

14 Q. 6-1.

15 A. Oh, 6-1. Okay. Okay.

16 Q. This Page 6-1 has the heading
17 "6 Conclusions"; correct?

18 A. Yes.

19 Q. Is this a complete list of all
20 the opinions you offer in this case?

21 MS. BAUGHMAN: Objection.
22 Form.

23 THE WITNESS: The -- those are
24 the opinions that we offered in this
25 report.

1 Q. BY MS. SILVERSTEIN: Okay. And
2 if you could turn to Page 1-1 in your
3 rebuttal report, which is Exhibit 3.

4 A. Okay.

5 Q. And that says "Summary of
6 Opinions" on the top of that page; correct?

7 A. Yes.

8 Q. Are Pages 6-1 in your initial
9 report and 1-1 in your rebuttal report, are
10 those -- is that a complete list of the
11 opinions that you'll -- you're offering in
12 this case?

13 MS. BAUGHMAN: Objection.
14 Form.

15 We're not -- everything is in
16 both reports. We're not limiting it
17 to two pages.

18 Q. BY MS. SILVERSTEIN: Are there
19 any opinions that are not listed on one of
20 these two pages?

21 MS. BAUGHMAN: Objection.
22 Form.

23 THE WITNESS: I mean, both of
24 these pages are summary pages, so we
25 tried to capture our opinions on these

1 two pages, but...

2 Q. BY MS. SILVERSTEIN: Okay. Are
3 all of your reports and the -- or all of your
4 opinions and the bases for your opinions
5 listed in either your initial report or your
6 rebuttal report?

7 THE WITNESS: Current --

8 MS. BAUGHMAN: Objection.

9 Form.

10 THE WITNESS: Currently, yes.

11 Q. BY MS. SILVERSTEIN: What do
12 you mean "currently"?

13 A. All the opinions that we've
14 formed so far are included in these two
15 documents.

16 Q. Are you planning to offer any
17 additional opinions?

18 MS. BAUGHMAN: Objection.

19 Form.

20 THE WITNESS: I believe that we
21 have the -- the ability, upon learning
22 new information or at the request of
23 our legal team, we could offer
24 additional opinions in the future,
25 but --

1 Q. BY MS. SILVERSTEIN: Are
2 there --

3 A. -- right now -- right now, this
4 is -- this is what we have.

5 Q. Are you aware of any opinions
6 that you are working on that you may offer in
7 the future?

8 MS. BAUGHMAN: Objection.
9 Form.

10 THE WITNESS: No.

11 Q. BY MS. SILVERSTEIN: Are there
12 any opinions in either your initial report or
13 your rebuttal report that you no longer agree
14 with?

15 A. No.

16 Q. How long did it take you to
17 conduct -- to model the Tarawa Terrace
18 post-audit?

19 A. What do you mean?

20 Q. How many hours did you spend
21 working on the Tarawa Terrace post-audit
22 before completing your first report?

23 A. I would have to look it up.

24 Q. Do you have an estimate?

25 A. No.

1 Q. Did you spend more than
2 100 hours working on the Tarawa Terrace
3 post-audit before offering your first report?

4 MS. BAUGHMAN: Objection.

5 Form.

6 His hours are in the bills.

7 You already have that.

8 THE WITNESS: Yeah. Yeah, I
9 would refer to my billing.

10 Q. BY MS. SILVERSTEIN: Okay. And
11 you didn't start working on the Tarawa
12 Terrace post-audit before September of 2024;
13 correct?

14 A. Correct.

15 Q. Okay. I want to start with
16 your initial report, Exhibit 2. You were
17 asked to provide a post-audit of the
18 groundwater flow and transport models
19 developed by the ATSDR for Tarawa Terrace; is
20 that correct?

21 A. Correct.

22 Q. Were you asked to do anything
23 other than provide a post-audit and your
24 opinions related to the post-audit?

25 A. No.

1 Q. When we're talking about a
2 groundwater model, is it fair to say that a
3 groundwater model is a computer model
4 simulating groundwater flow through an
5 aquifer?

6 MS. BAUGHMAN: Objection.

7 Form.

8 THE WITNESS: That could be one
9 model.

10 Q. BY MS. SILVERSTEIN: Is that
11 the kind of model that you -- was involved
12 in -- in your work for this case?

13 MS. BAUGHMAN: Objection.

14 Form.

15 THE WITNESS: There were --
16 there were two models that we did --
17 that we worked on.

18 Q. BY MS. SILVERSTEIN: Okay. And
19 what -- what are those two models?

20 A. The groundwater flow model --

21 Q. Okay.

22 A. -- which was MODFLOW-based, and
23 a groundwater flow fate and transport model
24 which was MT3DMS-based.

25 Q. Okay. And you would agree that

1 a groundwater model is a simplified version
2 of reality?

3 A. I wouldn't say -- use the word
4 "simplified." I would say "represent." A
5 model to represent -- to attempt to represent
6 reality.

7 Q. Okay. But you would agree that
8 it doesn't perfectly represent reality?

9 MS. BAUGHMAN: Objection.

10 Form.

11 THE WITNESS: Correct.

12 Q. BY MS. SILVERSTEIN: It doesn't
13 perfectly reproduce the subsurface
14 conditions?

15 MS. BAUGHMAN: Objection.

16 Form.

17 THE WITNESS: Correct.

18 Q. BY MS. SILVERSTEIN: And you'd
19 agree that that's because the groundwater
20 model can't take into account everything that
21 exists in the real world that affects the --
22 the water?

23 MS. BAUGHMAN: Objection.

24 Form.

25 THE WITNESS: Correct.

1 Q. BY MS. SILVERSTEIN: Generally
2 speaking, would it be correct to say that a
3 groundwater model is an approximation of a
4 complex field situation?

5 MS. BAUGHMAN: Objection.

6 Form.

7 THE WITNESS: Approximation?

8 Sure.

9 MS. SILVERSTEIN: I'm handing
10 you Exhibit 9.

11 (Exhibit 9 was marked for identification.)

12 Q. BY MS. SILVERSTEIN: I handed
13 you Exhibit 9, which is an article titled
14 "Predictive Accuracy of a Ground-Water Model
15 - Lessons from a Postaudit."

16 Do you see that?

17 A. Yes.

18 Q. And the author is Leonard
19 F. Konikow?

20 A. Yes.

21 Q. Do you recognize the author's
22 name?

23 A. Yes.

24 Q. And you're aware that
25 Dr. Konikow is an expert retained by the

1 plaintiffs in this litigation?

2 A. Yes.

3 Q. Would you agree that
4 Dr. Konikow is an expert in the field of
5 hydrologic modeling?

6 A. Yes.

7 Q. Have you read this study
8 before?

9 A. I don't believe so.

10 Q. I want to direct you to
11 Page 183. At the bottom of Page 183, it says
12 "An aquifer-simulation model is no more than
13 an approximation of a complex field" --

14 MS. BAUGHMAN: Where are you --
15 I'm sorry. Where are you reading
16 from?

17 THE WITNESS: Just the bottom
18 of --

19 MS. SILVERSTEIN: The bottom
20 paragraph --

21 THE WITNESS: Bottom left --
22 left side.

23 MS. SILVERSTEIN: -- on the
24 left side.

25 Q. I'll start again.

1 It says "An aquifer-simulation
2 model is no more than an approximation of a
3 complex field situation. Improvements in
4 the" -- "in the approximation are always
5 possible; thus, models should be considered
6 as dynamic representations of nature, subject
7 to further refinement and improvement. As
8 new information becomes available, previous
9 forecasts could and should be modified."

10 Did I read that correctly?

11 A. Yes.

12 Q. Do you agree that models can
13 and should be modified when new information
14 becomes available?

15 MS. BAUGHMAN: Objection. Form
16 and foundation.

17 He hasn't read this article.
18 He doesn't understand the context.

19 You want him to read the
20 article first?

21 MS. SILVERSTEIN: Nope.

22 Q. Do you agree with that, when
23 you learn new information, a modeler should
24 revise the model?

25 MS. BAUGHMAN: Objection.

1 Form.

2 THE WITNESS: You could.

3 Doesn't -- it's not -- it's not a
4 requirement, if that's what you're
5 asking.

6 Q. BY MS. SILVERSTEIN: So as new
7 information becomes available, in your
8 opinion, it's okay for modelers to not
9 consider that information in the model?

10 MS. BAUGHMAN: Objection.

11 Form.

12 THE WITNESS: They can consider
13 it. I -- I would -- I look on this
14 and say -- and Lenny says that they
15 could be modified.

16 Q. BY MS. SILVERSTEIN: And he
17 also says that they should be modified;
18 correct?

19 A. Sure.

20 Q. You can go ahead and set that
21 exhibit aside.

22 The goal of your post-audit for
23 Tarawa Terrace was to extend the range of the
24 groundwater flow and transport model from
25 1995 to 2008; right?

1 A. Correct.

2 Q. Did you evaluate any data
3 mining techniques that ATSDR used in their
4 Tarawa Terrace groundwater flow and transport
5 model?

6 A. Such as?

7 Q. Did you evaluate any of them?

8 A. Data mining techniques?

9 Q. Did you evaluate how ATSDR
10 determined the parameters of the Tarawa
11 Terrace model?

12 MS. BAUGHMAN: Objection.
13 Form.

14 THE WITNESS: We -- we read the
15 reports.

16 Q. BY MS. SILVERSTEIN: You read
17 Chapters A, C, and F; is that correct?

18 A. Correct.

19 Q. And those are the only chapters
20 that you reviewed; correct?

21 A. Correct.

22 Q. Did you review the conceptual
23 model created by ATSDR?

24 MS. BAUGHMAN: Objection.
25 Form.

1 THE WITNESS: To the extent
2 that they were specified in those
3 reports.

4 Q. BY MS. SILVERSTEIN: Did you
5 note any flaws in ATSDR's conceptual model?

6 MS. BAUGHMAN: Objection.
7 Form.

8 THE WITNESS: No.

9 Q. BY MS. SILVERSTEIN: If you had
10 noted flaws in the conceptual model, would
11 that change any of your opinions?

12 MS. BAUGHMAN: Objection.
13 Form.

14 THE WITNESS: We were asked to
15 extend the model, not critique the --
16 the model.

17 Q. BY MS. SILVERSTEIN: Did you
18 evaluate ATSDR's selection of boundary and
19 initial conditions for their model?

20 A. Only to the extent of reading
21 the reports.

22 Q. Did you evaluate their
23 calibration process?

24 A. Only to become familiar with
25 what they did.

1 Q. Did you evaluate ATSDR's
2 sensitivity analysis?

3 A. Only to the extent of what they
4 reported.

5 MS. SILVERSTEIN: I'm handing
6 you Exhibit 10.
7 (Exhibit 10 was marked for identification.)

8 Q. BY MS. SILVERSTEIN: I handed
9 you Exhibit 10, which has the Bates stamp
10 ending on the bottom right-hand side of the
11 first page ending in 486488.

12 Have you seen this document
13 before?

14 A. No.

15 Q. Are you aware of who Thomas
16 Sinks is?

17 A. No.

18 Q. And are you -- were you aware
19 that the Navy critiqued the ATSDR Tarawa
20 Terrace model?

21 MS. BAUGHMAN: Objection.
22 Form.

23 Aware as of when?

24 Q. BY MS. SILVERSTEIN: Prior to
25 submitting your initial report, were you

1 aware that the Navy critiqued the ATSDR
2 Tarawa Terrace report?

3 A. I would assume so. I -- I'm --
4 I've not seen this document. I did not read
5 any critiques. I assumed that -- that it
6 existed.

7 Q. Okay. So since you didn't
8 review any critiques prior to finalizing your
9 initial report, you didn't consider any
10 critiques from the Navy in your post-audit;
11 correct?

12 MS. BAUGHMAN: Objection.
13 Form.

14 THE WITNESS: Correct.

15 Q. BY MS. SILVERSTEIN: Is it your
16 understanding that ATSDR performed a
17 sensitivity analysis to determine the
18 relative importance of individual model
19 parameters?

20 A. Can you ask that question
21 again?

22 Q. Sure.

23 If you could go to the page
24 ending in the Bates 6492.

25 A. Okay.

1 Q. And looking at the bottom
2 paragraph, it says "The ATSDR performed a
3 sensitivity analysis to determine the
4 relative importance of individual model
5 parameters"; right?

6 A. Yes.

7 Q. And then two sentences after
8 that it says "The model was run 840 times to
9 produce 'realizations' that form a
10 distribution of simulated PCE concentrations,
11 rather than a single result"; right?

12 A. Yes.

13 Q. And you're aware that certain
14 combinations of input parameters resulted in
15 wells drying out?

16 MS. BAUGHMAN: Objection.

17 Form. Foundation.

18 THE WITNESS: That's what it
19 says here.

20 Q. BY MS. SILVERSTEIN: What does
21 it mean when the input parameters result in
22 the wells drying out?

23 A. Typically in a groundwater flow
24 model, if you -- if the parameters like
25 hydraulic connectivity and storage are such

1 that you try to pump water, that -- that well
2 can go dry.

3 Q. Okay. This happened in 330 out
4 of the 840 realizations that ATSDR did?

5 MS. BAUGHMAN: Objection. Form
6 and foundation.

7 THE WITNESS: Based on what
8 they -- what they wrote, yes.

9 Q. BY MS. SILVERSTEIN: Which made
10 those realizations not viable; correct?

11 MS. BAUGHMAN: Same objections.

12 THE WITNESS: It could. Not
13 necessarily. I mean, again, I'm
14 not -- I know what they did. I don't
15 know why they made the decision to not
16 use those.

17 Q. BY MS. SILVERSTEIN: Right.
18 And you're -- is it your understanding that
19 none of the wells, in reality, dried out?

20 A. I don't know that.

21 Q. Okay. The details of the
22 sensitivity analysis were in Tarawa Terrace's
23 Chapter I. You didn't review Chapter I;
24 correct?

25 A. That is correct.

1 Q. Why not?

2 A. We weren't provided that
3 document from the legal team, I believe.

4 Q. Did you review ATSDR's
5 uncertainty analysis?

6 A. No.

7 Q. We've been talking about ATSDR
8 doing a hindcasting model. Would it be
9 accurate to say that a hindcasting model is
10 attempting to recreate something that
11 happened in the past?

12 A. Correct.

13 Q. ATSDR didn't do a forecasting
14 model; right?

15 A. That's my understanding.

16 Q. A forecasting model would take
17 data and assumptions and predict the movement
18 of contaminants in the water system into the
19 future?

20 A. Correct.

21 Q. For the ATSDR's model, they use
22 MT3DMS to model PCE in the -- Tarawa
23 Terrace's water system; right?

24 A. Correct.

25 Q. They used TechFlowMP -- you're

1 aware that they used TechFlowMP to model the
2 PCE degradation byproducts; right?

3 A. I'm aware of that.

4 Q. And that means they used
5 TechFlowM3 [sic] to model TCE, vinyl
6 chloride, and DCE; right?

7 A. That's my understanding.

8 Q. Your post-audit was of the
9 MT3DMS portion of the Tarawa Terrace
10 modeling; right?

11 A. Correct.

12 Q. And so you didn't look at the
13 degradation of PCE into other byproducts;
14 right?

15 A. That's correct.

16 Q. So you'd agree that you have no
17 opinion on whether TechFlowMP's model of the
18 PCE degradation byproducts is reliable?

19 A. I have no opinion.

20 Q. You're -- in your initial
21 report, you said that after extending the
22 19- -- the model from 1995 to 2008, you
23 compared the output of the transport model
24 with the concentrations sampled at monitoring
25 wells during the 1995 to 2008 time period; is

1 that right?

2 A. Say -- say that again.

3 Q. Sure. After you extended the
4 model from 1995 to 2008, you then compared
5 the output of that extended model to the
6 sampling data during that same time period,
7 1995 to 2008; right?

8 A. Yes.

9 Q. And you did that to assess the
10 performance of the model as an interpretive
11 and predictive tool?

12 MS. BAUGHMAN: Objection.
13 Form.

14 THE WITNESS: No, not -- not a
15 predictive tool.

16 Q. BY MS. SILVERSTEIN: Okay. And
17 what do you mean that you did it to assess
18 the performances of the model as an
19 interpretive tool?

20 A. Can you show me where I said
21 that?

22 Q. Sure. Well, so did you extend
23 it for -- did you -- what kind of analysis
24 did you perform on the model after extending
25 it from 1995 to 2008?

1 A. Well, I mean, that's all
2 contained in the post-audit. We -- basically
3 we looked at the -- we looked at the computed
4 numbers at the observation points of
5 comparing the computed versus the observed.

6 Q. Okay. And did you compare the
7 computed versus the observed in order to see
8 how the model performed?

9 A. Correct.

10 Q. And would it -- would you agree
11 that if the model matched sample
12 concentrations closely, then the model's more
13 likely to be accurate?

14 MS. BAUGHMAN: Objection.

15 Form.

16 THE WITNESS: Correct.

17 Q. BY MS. SILVERSTEIN: Okay. If
18 the model didn't match observed
19 concentrations closely, there was a big
20 difference between the values, would it mean
21 that the simulated model is less likely to be
22 accurate?

23 MS. BAUGHMAN: Objection.

24 Form.

25 THE WITNESS: You could

1 probably make that -- you could
2 probably make that case.

3 Q. BY MS. SILVERSTEIN: So I want
4 to talk a little bit about the data that was
5 available for you, but I want to start with
6 what kind of -- what types of data do you
7 consider necessary to do a historical
8 reconstruction?

9 MS. BAUGHMAN: Objection.
10 Form.

11 THE WITNESS: I would look for
12 as much information as I could get.

13 Q. BY MS. SILVERSTEIN:
14 Information about what?

15 A. The groundwater -- the
16 groundwater -- the -- the aquifer
17 characteristics, pumping, recharge, the
18 boundary conditions that you would use; you
19 know, all of the parameters that would go
20 into the model.

21 Q. Okay. And would it be fair to
22 say that if you had the values for input
23 parameters that were specific to the site you
24 were modeling, that would make the historical
25 reconstruction more accurate?

1 MS. BAUGHMAN: Objection.

2 Form.

3 THE WITNESS: It would help.

4 Q. BY MS. SILVERSTEIN: Is a
5 historical reconstruction model a hindcasting
6 model? Are they the same thing?

7 A. Yes, I would say -- I would say
8 so.

9 Q. So if I use them
10 interchangeably --

11 A. Sure.

12 Q. -- we can assume that we're
13 talking about --

14 A. Sure.

15 Q. -- the same kind of modeling
16 work?

17 A. Sure.

18 MS. SILVERSTEIN: Okay. We've
19 been going for over an hour. I think
20 this would be a good time to take a
21 break.

22 THE WITNESS: That's fine.

23 THE VIDEOGRAPHER: We're off
24 the record. The time is 11:44.

25 (The lunch break was taken from

1 11:44 p.m. until 12:56 p.m.)

2 THE VIDEOGRAPHER: We're back
3 on the record. The time is 12:56.
4 This is Media Number 3.

5 Counsel may proceed.

6 Q. BY MS. SILVERSTEIN: Hi again,
7 Mr. Davis.

8 Did you -- while we were on the
9 lunch break just now, did you speak with your
10 attorneys about the substance of your
11 testimony?

12 A. Yes. They told me I was doing
13 a good job.

14 Q. Did they talk to you about the
15 questions that I was asking or what your
16 responses should be?

17 A. No.

18 Q. Is there anything that you
19 answered earlier that you'd like to change?

20 A. No.

21 Q. If you could go ahead and pull
22 up Exhibit 2, which is your initial report.
23 I think it's the one that's open right there.

24 A. Yeah.

25 Q. A lot of documents.

1 A. It's okay.

2 Q. And if you could turn to the
3 Executive Summary.

4 All right. So then on the
5 second page of the executive summary, you
6 said "Despite the inherent challenges in
7 simulating complex subsurface conditions and
8 dealing with incomplete data, the model
9 effectively simulates long-term trends and
10 contaminant migration."

11 What are the inherent
12 challenges in simulating complex subsurface
13 conditions?

14 A. I would say the main challenge
15 is you never have enough data, and
16 particularly with transport models, the
17 heterogeneities, the differences in the
18 subsurface, make it complex and make it
19 challenging.

20 Q. You also said "dealing with
21 incomplete data." What do you mean by
22 "dealing with incomplete data"?

23 A. As I just said, you always want
24 more data, and so since there's this desire
25 to have more data, the data that you have is

1 incomplete.

2 Q. What's the effect -- how does
3 dealing with incomplete data affect your
4 modeling work?

5 MS. BAUGHMAN: Objection.

6 Form.

7 THE WITNESS: It -- it -- well,
8 as I said, the more data you have, the
9 more confidence you have in the model.

10 Q. BY MS. SILVERSTEIN: How
11 much -- in your opinion, how much data do you
12 need to accurately --

13 A. That's --

14 Q. -- do a model?

15 MS. BAUGHMAN: Wait until she
16 finishes.

17 You were done?

18 I'm going to object to the
19 form.

20 THE WITNESS: Okay. Yeah,
21 that's -- that's completely
22 subjective. It's never enough, and
23 there's -- there's not a definition
24 written, oh, this is -- this is
25 sufficient.

1 Q. BY MS. SILVERSTEIN: In your
2 personal experience, is there an amount of
3 data that, you know, if you have less than
4 that amount of data, you can't confidently do
5 a water model?

6 MS. BAUGHMAN: Objection.

7 Form.

8 THE WITNESS: No.

9 MS. SILVERSTEIN: I am handing
10 you Exhibit 11.

11 (Exhibit 11 was marked for identification.)

12 Q. BY MS. SILVERSTEIN: This is
13 Exhibit 11, and on the first page it says
14 "The" -- ground book -- or "The Handbook" --
15 excuse me -- "of Groundwater Engineering,
16 Editor-in-Chief Jacques W. Delleur."

17 Do you see that?

18 A. Yes.

19 Q. And if you go to the first
20 page, that says "20 Groundwater Modeling"
21 with -- the author is Leonard F. Konikow and
22 Thomas E. Reilly.

23 Do you see that?

24 A. Yes.

25 Q. Have you reviewed this book,

1 The Handbook of Groundwater Engineering,
2 before?

3 A. No.

4 Q. If you could turn to
5 Section 20.6.8.

6 A. How old is this book? 1999,
7 okay. Excuse me, what page?

8 Q. 20.6.8. The page says 20-26 at
9 the top.

10 Are you at Section 20.6.8?

11 A. Yeah.

12 Q. And that section is titled
13 "Predictions and Postaudits"; right?

14 A. Yes.

15 Q. And it says -- the first
16 paragraph, it starts "As model calibration
17 and parameter estimation are keyed to a set
18 of historical data, the confidence in and
19 reliability of the calibration process is
20 proportional to the quality and
21 comprehensiveness of the historical record."

22 Do you agree with that?

23 MS. BAUGHMAN: Objection.

24 Form.

25 THE WITNESS: Yes, but, you

1 know, they use the word
2 "proportional," so that -- that word
3 "proportional" could vary widely.

4 Q. BY MS. SILVERSTEIN: Okay.
5 Would you agree that the more historical data
6 a modeler has, the more reliable the model
7 is?

8 MS. BAUGHMAN: Objection.
9 Form.

10 THE WITNESS: It's -- it's
11 helpful in -- in giving you more
12 confidence.

13 Q. BY MS. SILVERSTEIN: More
14 confidence that the model is a better
15 representation of real-world conditions?

16 MS. BAUGHMAN: Objection.
17 Form.

18 THE WITNESS: No. More
19 confidence in reducing the
20 uncertainty.

21 Q. BY MS. SILVERSTEIN: And so,
22 similarly, would that mean that the less
23 historical data that's available, the less
24 confident you can be in a model?

25 MS. BAUGHMAN: Objection.

1 Form.

2 THE WITNESS: Could be. I
3 mean, I guess what I wanted -- what I
4 wanted to add is just having more data
5 doesn't necessarily make the model
6 more accurate.

7 Q. BY MS. SILVERSTEIN: Why is
8 that?

9 A. Because you -- you may not --
10 the -- you could have additional data that
11 wouldn't require changes to the model, and if
12 you don't make any changes to the model, then
13 you're going to get the same results.

14 Q. Okay. The last sentence in
15 that paragraph is "A reasonable guideline is
16 to predict only for a time comparable to the
17 period that was matched."

18 A. Okay. Let's see here.

19 MS. BAUGHMAN: And you can feel
20 free to read as much of this as you
21 want since you've never read this
22 chapter.

23 THE WITNESS: "The original
24 guideline is to predict only" --

25 MS. BAUGHMAN: Don't read out

1 loud, okay?

2 THE WITNESS: Okay. Sorry.

3 MS. BAUGHMAN: I'll object to
4 the form.

5 THE WITNESS: Okay. What --
6 what's the question?

7 Q. BY MS. SILVERSTEIN: What is
8 your understanding of what it means that "A
9 reasonable guideline is to predict only for a
10 time comparable to the period that was
11 matched"?

12 MS. BAUGHMAN: Objection.
13 Form.

14 He didn't write it.

15 THE WITNESS: Yeah, I'm -- I'm
16 not sure what that sentence means.

17 Q. BY MS. SILVERSTEIN: Do you
18 have any understanding, reading that today?

19 MS. BAUGHMAN: Objection.
20 Form.

21 THE WITNESS: No.

22 MS. SILVERSTEIN: Okay. You
23 can go ahead and put that exhibit
24 aside.

25 Q. One of the pieces -- the types

1 of data that you used in your post-audit is
2 precipitation values; right?

3 A. Correct.

4 Q. And you agree that the original
5 model used precipitation values from
6 Maysville-Hofmann Forest Station; right?

7 A. That's my understanding.

8 Q. For the post-audit, you
9 attempted to obtain precipitation data from
10 Maysville-Hofmann Forest Station; right?

11 A. Correct.

12 Q. Why did you first -- why did
13 you try and attempt to -- attempt to obtain
14 data from Maysville-Hofmann Forest Station?

15 A. Made sense to use the same
16 source.

17 Q. Why would it make sense to use
18 the same source?

19 MS. BAUGHMAN: Objection.
20 Form.

21 THE WITNESS: It just -- it
22 just makes sense if they -- if they
23 used -- if they got data from one
24 source, there would be no reason,
25 unless that data did not exist, to use

1 some other source.

2 Q. BY MS. SILVERSTEIN: Okay.
3 When you attempted to obtain this data, you
4 discovered there were three data sets from
5 Maysville-Hofmann Forest Station; right?

6 A. I just recall that the -- for
7 the -- for the years that we were looking
8 for, the original source wasn't complete.

9 Q. When you say "original
10 source" --

11 A. Where they -- where they got
12 the -- the precipitation from for the
13 original model.

14 Q. Okay. For the post-audit --
15 and I'm on Page 3-1, under Section 3.2
16 "Rainfall-Recharge."

17 A. Correct.

18 Q. You found -- it says "We found
19 three different precipitation data sets that
20 were purported to be from the Hoffmann Forest
21 Station, but each of these data sets was
22 determined to be unusable"; is that right?

23 A. Yeah, incomplete.

24 Q. Why did you determine that the
25 data was unusable?

1 A. Incomplete.

2 Q. What do you mean by
3 "incomplete"?

4 A. Missing data.

5 Q. Meaning that there were time
6 periods that there was no data for?

7 A. Correct.

8 Q. Since you determined the
9 Hoffmann Forest Station data was unusable,
10 you used data from other nearby stations;
11 right?

12 A. Correct.

13 Q. And you said the mean rainfall
14 for each of these gauges over the 1951 to
15 1994 period is similar to the mean rainfall
16 for the Hoffmann Forest Station over the same
17 period?

18 A. Correct.

19 Q. Did you determine whether the
20 mean rainfall for each of the -- the other
21 stations that you used from 1995 to 2008 was
22 similar to the mean rainfall for Hoffmann
23 Forest Station during that time period?

24 A. That was difficult because that
25 data was incomplete.

1 Q. Okay. Was the data for
2 Hoffmann Forest Station from 1951 to 1994
3 complete?

4 A. I assume that it was because
5 that's what was used in the model.

6 Q. Did you do anything to confirm
7 whether or not that data was complete?

8 A. No. We based -- we just -- we
9 looked -- we -- we reviewed what -- the
10 documentation here, and then -- then they
11 reported those monthly recharge values in --
12 in that model, and so that's what we --
13 that's what we were based on -- we were
14 basing it on, not the original raw data. We
15 had no access to the original raw data that
16 they had.

17 Q. Okay. So where did you get the
18 precipitation data for Hoffmann Forest
19 Station from 1995 to 2008?

20 A. We requested it from various --
21 North Carolina State and various -- various
22 location -- various organizations to try to
23 get that data for that period of time.

24 Q. Did you --

25 A. And nobody had complete data.

1 Q. Okay. Did you request the data
2 for Hoffmann Forest Station from those same
3 sources for 1951 to 1994?

4 A. No.

5 Q. It's correct that you used the
6 precipitation values to calculate the
7 recharge coefficient; right?

8 A. The recharge rate.

9 Q. The recharge rate, okay.
10 And you used .235 as the
11 recharge rate?

12 A. Yeah. That was the same that
13 was used in the original model.

14 Q. And my understanding is the
15 recharge rate is equal to the average
16 effective recharge divided by the average
17 annual precipitation; is that right?

18 A. Say that again.

19 Q. That to get the recharge rate,
20 you do the average effective recharge divided
21 by the average annual precipitation; is that
22 right?

23 A. No.

24 Q. How do you get --

25 A. No. You're going to get --

1 Q. -- the recharge rate?

2 A. You're going to get -- you're
3 going to get monthly recharge -- or monthly
4 precipitation numbers --

5 Q. Okay.

6 A. -- and you're going to multiply
7 by this factor, and that's the amount of
8 water that's applied to the model, that goes
9 into the model.

10 Q. Okay. So you say you're going
11 to multiply that by this factor. Are you
12 referring to the .235?

13 A. Correct.

14 Q. How do you determine that
15 recharge rate? Like, how do you determine
16 the .235?

17 A. That was given to us by the
18 legal team. That was what was used in the
19 original model. So to be consistent, we used
20 the same. There was no -- there was no
21 reason that the -- that that rate had
22 changed. That factor, I should say.

23 Q. Okay. And do you know how
24 ATSDR determined that factor?

25 A. No.

1 Q. So would it be fair to say that
2 you didn't do anything to confirm that
3 ATSDR's factor was correct?

4 A. No.

5 Q. No, you didn't do anything to
6 confirm or, no, that's not correct?

7 A. That was outside of our scope.

8 Q. Okay. You also considered
9 remediation well pumping data for your
10 post-audit; right?

11 A. Considered?

12 Q. Did you use the remediation
13 well pumping data?

14 A. Correct.

15 Q. My understanding is that the
16 remediation wells withdraw water from the
17 aquifer; is that right?

18 A. That's correct.

19 Q. And is it correct that
20 withdrawing water from the aquifer is
21 impacted -- impacts -- excuse me -- both the
22 flow field and the subsequent movement of
23 contaminants simulated by MT3DMS?

24 A. Correct.

25 Q. And you'd agree that inaccurate

1 remediation well data would affect the model
2 results; right?

3 MS. BAUGHMAN: Objection.

4 Form.

5 THE WITNESS: Affect it in
6 which way?

7 Q. BY MS. SILVERSTEIN: If you
8 found out that the remediation -- that
9 remediation well data was inaccurate, could
10 that change the results of the post-audit?

11 MS. BAUGHMAN: Objection.

12 Form.

13 THE WITNESS: Change the
14 results of the post-audit? Like,
15 which results are we talking about?

16 Q. BY MS. SILVERSTEIN: Could it
17 change the concentration data produced by
18 MT3DMS?

19 A. It's possible.

20 MS. BAUGHMAN: Objection.

21 Form.

22 THE WITNESS: It's possible.

23 Q. BY MS. SILVERSTEIN: And --
24 okay. In your report, you said that you
25 received a list of remediation wells and

1 pumping history for 1999 to 2008; is that
2 right?

3 A. I believe that's correct.

4 Q. Where did you get that list of
5 pumping -- pumping well history from?

6 A. From the legal team.

7 Q. Do you know what the source of
8 that data is?

9 A. No.

10 Q. When I say "the pumping
11 history," that includes, like, the pumping
12 rate data; right?

13 A. That's correct.

14 Q. And in your report, you say you
15 have a list of remediation wells and pumping
16 history for 1999 to 2008.

17 Does that mean that you did not
18 have remediation well pumping history from
19 1995 to 1998?

20 A. I believe there's a table that
21 lists -- yeah, Table 2 lists the information
22 that we were given for the five remediation
23 wells pumping from 1995 -- well, our model
24 went from 1995 to 2008, and we were given
25 this data that's reflected in Table 2.

1 Q. Okay. And Table 2 reflects
2 pumping rate data from November 1999 through
3 March 2008; right?

4 A. Correct.

5 Q. So there's -- you weren't
6 provided pumping rate data for 1995 through
7 1998; right?

8 MS. BAUGHMAN: Objection. Form
9 and foundation.

10 Q. BY MS. SILVERSTEIN: Were you
11 provided any pumping rate data for 1995?

12 A. No.

13 MS. BAUGHMAN: Same objection.

14 Q. BY MS. SILVERSTEIN: Were you
15 provided pumping rate data for 1996?

16 MS. BAUGHMAN: Same objection.

17 THE WITNESS: No.

18 Q. BY MS. SILVERSTEIN: Were you
19 provided pumping rate data for 1997?

20 MS. BAUGHMAN: Same objections.

21 THE WITNESS: No.

22 Q. BY MS. SILVERSTEIN: And were
23 you provided any pumping rate data for 1998?

24 MS. BAUGHMAN: Same objections.

25 THE WITNESS: No.

1 Q. BY MS. SILVERSTEIN: The
2 pumping rate data that you do have -- well,
3 first, did you prepare Table 2?

4 A. My staff did, yes.

5 Q. And you said a minute ago that
6 this is all of the pumping rate data that you
7 have; is that correct?

8 A. That's correct.

9 Q. This data is for five different
10 remediation wells?

11 A. Correct.

12 Q. And you have, looks like, eight
13 data points for each well; is that correct?

14 A. Correct.

15 Q. So would it be accurate to say
16 that you have data points for five wells for
17 eight days over a 13-year time span?

18 MS. BAUGHMAN: Objection.

19 Form.

20 THE WITNESS: Five wells,
21 eight -- some of them didn't have, so
22 you couldn't say, you know, because
23 RWS-1A did not have any -- was not
24 pumping in 2007 -- on February 20,
25 2007, and March 11, 2008, so this

1 table reflects what we were given and
2 what we put in the model.

3 Q. BY MS. SILVERSTEIN: Okay. I
4 want to talk a little bit about some of the
5 assumptions that you made with the
6 remediation well data.

7 A. Okay.

8 Q. So looking at this table, the
9 data points show that the pumping rate
10 changed for each well over time; right?

11 A. (Witness nods head.)

12 Q. I'm sorry, is that a yes?

13 A. Yes, yes.

14 Q. Sorry, I just have to ask for
15 the answers to be verbal.

16 A. Yeah.

17 MS. BAUGHMAN: Objection.

18 Form.

19 It's actually not true.

20 THE WITNESS: Yeah, I was -- I
21 apologize. I wasn't -- I didn't wait
22 for your question, so if you can ask
23 the question again.

24 Q. BY MS. SILVERSTEIN: Sure.

25 The table shows that the

1 pumping rate for the wells changed over time;
2 right?

3 MS. BAUGHMAN: Objection.
4 Form.

5 THE WITNESS: Yes.

6 Q. BY MS. SILVERSTEIN: Okay. And
7 you'd agree that in between the data points,
8 you assumed that the pumping rate was --
9 remained steady; right?

10 A. Yes.

11 Q. What was that assumption based
12 on?

13 A. It was based on the fact that
14 we didn't have anything to tell us otherwise.
15 So RWS-1A was pumping at 5.5 GP gallons per
16 minute in November of 1999, and we assumed
17 that that was doing that until November 6,
18 2001.

19 Q. You would agree that you don't
20 have any data points for 2000 for Well
21 RWS-1A; right?

22 A. Correct.

23 Q. And because you don't have any
24 data points, you don't -- you can't know for
25 certain what the pumping rate was for 2000 --

1 at any point during 2000; right?

2 MS. BAUGHMAN: Objection.

3 Form.

4 THE WITNESS: Yeah, typical
5 modeling, typical protocol would be if
6 you don't have any information that
7 changed, then it's going to continue
8 until you have a data point that --
9 that -- that was recorded that said
10 it -- it hit the pumping ratios.

11 Q. BY MS. SILVERSTEIN: Okay. But
12 from my understanding, that doesn't mean that
13 you know that in --

14 A. No, of course not.

15 MS. BAUGHMAN: You've got to
16 let -- let her finish --

17 THE WITNESS: Oh, sorry.

18 MS. BAUGHMAN: -- her question
19 before you answer, okay?

20 THE WITNESS: Okay.

21 Q. BY MS. SILVERSTEIN: That
22 assumption doesn't mean that you know what
23 the pumping rate was at any point other than
24 on the dates that you have a data point for;
25 right?

1 MS. BAUGHMAN: Objection.

2 Form.

3 THE WITNESS: Correct.

4 Q. BY MS. SILVERSTEIN: So the
5 first well listed here is RWS-1A. And the
6 first data point in this table is November 1,
7 1999.

8 Would it be fair to assume that
9 that means the earliest data point you have
10 for Well RWS-1A's pumping rate is November 1,
11 1999?

12 A. Correct.

13 Q. How did you determine which
14 pumping rate to use between -- from
15 November 2, 1999, through November 5, 2001?

16 A. For RWS-1A?

17 Q. Yes. For any of the wells.

18 A. It would be the last known
19 pumping rate.

20 Q. If the pumping rate for Well
21 RWS-1A was higher than 5.5 gallons per minute
22 on November 2, 1999, through November 5,
23 2001, would that affect the concentrations
24 simulated by the model?

25 MS. BAUGHMAN: Objection.

1 Form.

2 THE WITNESS: Concentrations
3 where?

4 Q. BY MS. SILVERSTEIN: So you
5 used the pumping well data to calculate
6 concentrations from the well at -- in the
7 Tarawa Terrace water system; right?

8 A. Yes.

9 Q. Okay. So if the pumping rate
10 is higher, would -- could that affect the
11 concentrations that you calculated?

12 MS. BAUGHMAN: Objection.

13 Form.

14 THE WITNESS: The
15 concentrations where?

16 Q. BY MS. SILVERSTEIN: So where
17 specifically -- when you calculated
18 concentrations -- different concentrations,
19 where specifically were those for?

20 A. The concentrations were
21 calculated -- well, the model calculate --
22 calculates concentrations at every model
23 cell, and then we were specifically looking
24 at the observations. The observation points.

25 Q. Okay. So those same

1 observation points, assume you're talking
2 about the same observation point.

3 Would that -- would a higher
4 pumping rate potentially change that same
5 observation -- the concentration in that same
6 observation point?

7 MS. BAUGHMAN: Objection; form.
8 Objection; form.

9 THE WITNESS: It's possible.

10 Q. BY MS. SILVERSTEIN: You'd
11 agree that aside from these five wells
12 identified in Table 2, all other pumping
13 wells in the model had zero pumping rates
14 during the extended simulation you did?

15 A. That's my understanding, yes.

16 Q. And that means you assume those
17 wells were not pumping; right?

18 A. That's correct.

19 Q. Why did you make that
20 assumption?

21 A. That wasn't an assumption.
22 That was information that we were given by
23 the legal team.

24 Q. What information were you
25 provided?

1 A. That the only pumping that was
2 going on was based on Table 2.

3 Q. Okay. Did they -- were you
4 told that or were you provided some kind of
5 documentation?

6 A. We were provided the
7 documentation that we put in Table 2.

8 Q. And told that this was --
9 there -- that the other wells not listed here
10 were not pumping; is that right?

11 A. We were -- we were told this
12 was what was pumping during that period of
13 time.

14 Q. Okay. I want to go to Table 4.
15 Table 4 is titled "Observed PCE
16 Concentrations At Monitoring Wells, 1995 to
17 2008"; right?

18 A. Correct.

19 Q. Did you prepare this table?

20 A. No.

21 Q. Who prepared this table?

22 A. Dr. Jones.

23 Q. And are you familiar with the
24 information in the table?

25 A. I supplied the information to

1 him.

2 Q. Okay. Where did you get the
3 information from?

4 A. From the outputs of the model.

5 Q. Okay. So from my
6 understanding --

7 A. Oh, this is the observed. Oh,
8 okay, I take it back. I thought this was,
9 like, computed. So my apologies.

10 So this information was
11 provided to us by the legal team.

12 Q. And you'd agree that the --
13 there were localized discrepancies in error
14 magnitude, particularly in areas where
15 monitoring wells showed significant temporal
16 or spatial variability?

17 MS. BAUGHMAN: Objection.
18 Form.

19 THE WITNESS: Can you read that
20 question again?

21 Q. BY MS. SILVERSTEIN: Sure.

22 You said and would agree that
23 localized discrepancies and error magnitude,
24 particularly in areas where monitoring wells
25 showed significant -- that there were --

1 MS. BAUGHMAN: If you're
2 reading from the report, can you tell
3 us where you're reading from so he can
4 look at it.

5 MS. SILVERSTEIN: Sure.

6 Q. I'm just trying to understand.
7 Were there localized discrepancies in the
8 sampling data that you reviewed?

9 A. What --

10 MS. BAUGHMAN: Objection.
11 Form.

12 THE WITNESS: What do you mean
13 "discrepancies"?

14 Discrepancies --

15 MS. BAUGHMAN: Wait, wait.

16 THE WITNESS: Sorry.

17 Q. BY MS. SILVERSTEIN: Okay.
18 Okay. If you go to Page 4-2, let's start
19 there.

20 A. Okay.

21 Q. You said here that there were
22 "spatial variations in the observed
23 concentrations"; right?

24 A. Correct.

25 Q. Okay. What do you mean by

1 "spatial variations in the observed
2 concentrations"?

3 A. Meaning that I could have a
4 concentration at one point that said one
5 thing and -- and one right next to it or some
6 distance away that said something different.

7 Q. And what is your understanding
8 of why that would be?

9 A. Lots of different reasons.

10 Q. Okay. You said beginning on
11 the last sentence on Page 4-2 -- well, I'll
12 start the sentence before. "The observed
13 concentrations of this well" -- which is
14 RWS-4A -- "showed extreme fluctuations over
15 time. The observed concentration of 280
16 micrograms per liter in January 2002 was
17 followed only three months later by an
18 observed concentration of 6,900 micrograms
19 per liter - the highest value measured. Then
20 for the sequence of observations from 2003 to
21 2007, the concentrations oscillated from
22 1,100 to 0 to 1,000 to 92 to 1,600. This
23 high degree of fluctuation could be due to
24 sampling errors, differences in analytical
25 techniques, and/or extreme heterogeneity in

1 aquifer properties near the well"; right?

2 A. Correct.

3 Q. Okay. So if you can turn back
4 to Table 4. Well C13 shows a concentration
5 of 5,400 micrograms per liter in January of
6 2002; right?

7 A. Uh-huh.

8 Q. Is that a yes?

9 A. Correct.

10 Q. And five months later, May 1,
11 2002, it shows a value of 140 micrograms per
12 liter?

13 A. Yes.

14 Q. Is that -- when you referred to
15 large fluctuations in the text of your
16 report, is -- is that the kind of fluctuation
17 you're referring to?

18 A. That's an example.

19 Q. And you'd agree that the May
20 reading, the May 2002 reading, is less than
21 5 percent of the January 2002 reading?

22 A. Yes.

23 Q. Is this an anomaly?

24 MS. BAUGHMAN: Objection.

25 Form.

1 THE WITNESS: Anomaly?

2 Q. BY MS. SILVERSTEIN: Do you
3 consider it -- in your experience, would it
4 be normal that there would be this kind of
5 fluctuation?

6 MS. BAUGHMAN: Objection.

7 Form.

8 THE WITNESS: That's normal.

9 Q. BY MS. SILVERSTEIN: Okay. And
10 you described in your report temporal
11 anomalies. What -- what does a "temporal
12 anomaly" mean?

13 MS. BAUGHMAN: Can you show us
14 where in the report that is so he can
15 see the context.

16 MS. SILVERSTEIN: It's in
17 Section 4 where we were just looking.

18 Q. The last paragraph in Section 4
19 describes "This temporal and spatial
20 variability in concentrations at selected
21 wells illustrates the extreme variability
22 often seen when dealing with concentrations
23 from data from monitoring wells."

24 Do you see that?

25 A. Yes.

1 Q. Okay. Is this the kind of
2 temporal variability you're describing?

3 A. That is the temporal
4 variability, yes.

5 Q. The last sentence there on that
6 page says "Each of these sites with high
7 variability is generally correlated with
8 higher model error, as shown below in the
9 Results section"; is that right?

10 A. Yes.

11 Q. Could this type of temporal
12 variability have occurred at the observation
13 wells that were used in the original Tarawa
14 Terrace model?

15 MS. BAUGHMAN: Objection.
16 Form.

17 THE WITNESS: Yes, it could.

18 Q. BY MS. SILVERSTEIN: And that
19 would include Well TT-26?

20 MS. BAUGHMAN: Objection.
21 Form.

22 THE WITNESS: Yes.

23 Q. BY MS. SILVERSTEIN: So I want
24 to look down at -- back on Table 4 at Well
25 RWS-2A.

1 Do you see that?

2 A. Yes.

3 Q. Okay. It shows that there was
4 an observed concentration of 290 micrograms
5 per liter on August 1, 2002; is that right?

6 A. Yes.

7 Q. It also shows that the value on
8 the observed concentration on May 1, 2002,
9 was 79 micrograms per liter; right?

10 A. Yes.

11 Q. And -- well, after August 2002
12 is for November 1, 2002, and shows
13 98 micrograms per liter; right?

14 A. Yes.

15 Q. The value in May 2002 is less
16 than 30 percent of the value in August;
17 right?

18 A. Yes.

19 Q. And the value in November 2002
20 is about a third of what the value was in
21 August?

22 A. Yes.

23 Q. Would that be considered
24 temporal variability?

25 A. Yes.

1 Q. All right. A moment ago we
2 looked at the part of your report that says
3 that this kind of variability likely resulted
4 from natural subsurface variability sampling
5 errors, differences in analytical methods.

6 Do you remember that?

7 A. Yes.

8 Q. By sampling area -- error --
9 excuse me -- do you mean that the sample
10 results wouldn't reflect the actual
11 concentration in the water?

12 A. That's one -- that's one
13 possibility.

14 Q. Okay. What else does "sampling
15 error" mean?

16 A. Just how -- how the sample was
17 collected, how it was stored, how -- from the
18 moment that it was removed from the aquifer
19 to the moment it got to the lab.

20 Q. Okay. And the errors from the
21 moment it got to the aquifer to the moment it
22 got to the lab might mean that the sample
23 results don't reflect the concentration in
24 the water -- in the aquifer; right?

25 A. That's possible.

1 Q. Okay. I want to look at
2 Figure 6.

3 MS. BAUGHMAN: Did you say
4 "Figure" or "Table 6"?

5 MS. SILVERSTEIN: I said
6 "Figure 6."

7 MS. BAUGHMAN: Figure 6, okay.

8 Q. BY MS. SILVERSTEIN: And the
9 sampling errors that we discussed a moment
10 ago between the moment the sample is taken
11 and when it gets to the lab, is it possible
12 that those same -- that same type of sampling
13 error occurred with samples taken in the
14 1980s?

15 MS. BAUGHMAN: Objection.
16 Form.

17 THE WITNESS: It's possible.

18 Q. BY MS. SILVERSTEIN: And that
19 includes models taken at -- that includes
20 samples taken at Tarawa Terrace in the 1980s;
21 right?

22 MS. BAUGHMAN: Objection.
23 Form.

24 THE WITNESS: Yes, it's
25 possible.

1 Q. BY MS. SILVERSTEIN: Okay. So
2 Figure 6 is titled "Simulated versus observed
3 PCE concentrations from (a) Original Model
4 and (b) Extended Model Tarawa Terrace Flow
5 and Transport Model Post-Audit"; is that
6 right?

7 A. Correct.

8 Q. Did you make this figure?

9 A. No. I believe this was
10 Dr. Jones.

11 Q. It's fair to assume that you're
12 familiar with it?

13 A. Very much so. I gave him -- I
14 supplied him the data.

15 Q. Great.

16 Do you agree with how the data
17 in Figure 6 is visually portrayed?

18 MS. BAUGHMAN: Objection.

19 Form.

20 THE WITNESS: Yes, I agree how
21 it's visually prepared.

22 Q. BY MS. SILVERSTEIN: Are there
23 any changes that you would make to Figure 6?

24 MS. BAUGHMAN: Objection.

25 Form.

1 THE WITNESS: No.

2 MS. BAUGHMAN: You mean as -- I
3 mean, it was updated in the --

4 THE WITNESS: Yeah.

5 MS. BAUGHMAN: -- in the
6 rebuttal report --

7 THE WITNESS: Yeah.

8 MS. BAUGHMAN: -- is that what
9 you're asking?

10 Q. BY MS. SILVERSTEIN: Are there
11 any changes that you would make to how it is
12 portrayed?

13 A. No.

14 Q. Go ahead and look at
15 Section 5-2.

16 You would agree that the
17 simulated values from your post-audit are
18 biased on the high side; right?

19 MS. BAUGHMAN: Objection.
20 Form.

21 THE WITNESS: We did state in
22 our report that it appeared that the
23 computed values were biased high.

24 Q. BY MS. SILVERSTEIN: That means
25 that the computed values are higher than the

1 observed values; right?

2 A. Correct. But I would -- I
3 would add that where it was most important at
4 TT-26, the simulated values matched very
5 closely to the observed values.

6 Q. So in this report you state --
7 you said that when the sites with zero
8 observed or simulated concentrations are
9 factored in, the errors are balanced; right?

10 A. Where are you -- where are you
11 reading?

12 Q. Well, would you agree that when
13 you factor in the zero observed
14 concentrations, the -- the results are
15 balanced?

16 MS. BAUGHMAN: If you're
17 reading from his report, you need to
18 show -- he asked you where you're
19 reading from.

20 Q. BY MS. SILVERSTEIN: Okay. It
21 is in Section 5.1, the second paragraph. The
22 last sentence.

23 Do you -- do you agree that
24 when you factor in the -- the zero observed
25 or simulated concentrations, the errors are

1 balanced?

2 A. Well, we wrote "well balanced."

3 Q. You wrote "However, when the
4 sites with zero observed or simulated
5 concentrations not shown on Figure 6 are
6 factored in, the errors are balanced, as
7 indicated by the low mean error reported
8 above"; is that right?

9 MS. BAUGHMAN: It's the last
10 sentence of the second paragraph.

11 THE WITNESS: Okay, hold on.
12 Correct, yes.

13 Q. BY MS. SILVERSTEIN: Okay. I
14 want you to go to Page Roman Numeral vi, the
15 Executive Summary.

16 And if you look at the fourth
17 paragraph, the -- the third sentence you
18 wrote "There were localized discrepancies in
19 error magnitude, particularly in areas where
20 monitoring wells showed significant temporal
21 and spatial variability"; is that right?

22 A. Correct.

23 Q. Okay. So I want to go back to
24 Table 4.

25 My understanding, I believe

1 what you said earlier, is that this table
2 shows actual sample results at the monitoring
3 wells; is that right?

4 A. Correct.

5 Q. Okay. So, for example, Well C1
6 shows -- lists sample results for ten
7 different dates; is that right?

8 A. Correct.

9 Q. Okay. And then the dash for
10 June 1, 1997, and January 1, 2002, does that
11 mean that a sample wasn't taken from Well C1
12 on those dates?

13 A. I don't know. I assume, but I
14 don't know if that's the reason.

15 Q. Okay. When provided the --
16 this data for your use in the post-audit,
17 what did you understand the dashes -- like,
18 at June 1, 1997, and January 1, 2002, what
19 did you understand that to mean?

20 A. That no sample was recorded.

21 Q. And for Well C1, the "less than
22 DL," does that mean that the samples
23 collected yielded results below the detection
24 limit?

25 A. That's my understanding, yeah.

1 Q. Do you know what the detection
2 limit was?

3 A. In 19- -- or in 2000, not off
4 the top of my head.

5 Q. Okay. Would it be fair to say
6 that Well C1 doesn't exhibit any, like,
7 temporal anomalies, temporal variant --
8 variability?

9 A. No, because just because it was
10 below the detection limit doesn't mean that
11 it didn't vary.

12 Q. Okay. When you say "temporal
13 variability," does that mean any kind of
14 change in the concentration?

15 A. Yes.

16 Q. Okay. So even if it was going
17 from, for example, 58 micrograms per liter to
18 57 micrograms per liter, you would -- you
19 describe that as temporal variability?

20 A. Sure.

21 Q. Is -- when you talked about
22 temporal variability in your report, is that
23 what you were describing?

24 MS. BAUGHMAN: Objection.

25 Form.

1 THE WITNESS: No. We were --
2 we were talking more about wider
3 ranges than from 57 to 58.

4 Q. BY MS. SILVERSTEIN: Okay. And
5 when you say "wider ranges," what do you
6 mean?

7 MS. BAUGHMAN: Objection.
8 Form.

9 THE WITNESS: It's subjective.

10 Q. BY MS. SILVERSTEIN: Okay.
11 When you say "wider ranges" and -- in the
12 report that you wrote, what did you
13 subjectively mean?

14 MS. BAUGHMAN: Objection.
15 Form.

16 THE WITNESS: One example would
17 be C13.

18 Q. BY MS. SILVERSTEIN: Okay. And
19 that's because the difference between 5,400
20 to -- micrograms per liter to 140 micrograms
21 per liter is -- is large?

22 A. Is -- it's -- it's a
23 difference, yes.

24 Q. Okay. When you were discussing
25 temporal variability in your report, were you

1 referring to -- well, scratch that.

2 Is your understanding that
3 there could have been the kind of temporal
4 variability we're discussing in your report
5 in monitoring Well C1 based on the nondetect
6 sample results?

7 MS. BAUGHMAN: Objection.

8 Form.

9 THE WITNESS: It could, but the
10 lab reported it as nondetect -- or
11 below the detection level.

12 MS. SILVERSTEIN: Okay.

13 THE WITNESS: So we had nothing
14 to go by.

15 Q. BY MS. SILVERSTEIN: Okay. And
16 so would zero to the detection level, is that
17 a big enough difference that it would have
18 been temporal variability?

19 MS. BAUGHMAN: Objection.

20 Form.

21 MS. SILVERSTEIN: As described
22 in your report.

23 MS. BAUGHMAN: Objection.

24 Form.

25 THE WITNESS: Yes, it's

1 possible.

2 Q. BY MS. SILVERSTEIN: Do you
3 have an understanding of about where the
4 detection limit was for these samples?

5 A. In '97 and 2000, no, not off
6 the top of my head. I'd have to look it up.

7 Q. Do you know what the detection
8 limit for PCE is today?

9 A. I should know it off the top of
10 my head, but I would have to look it up.

11 Q. If the detection limit was 10
12 micrograms per liter, would you consider it
13 to be temporal variability as described in
14 your report if there was a defect -- if there
15 was a sample result of 1 microgram per liter
16 and a sample result of 10 micrograms per
17 liter?

18 MS. BAUGHMAN: Objection.

19 Form.

20 THE WITNESS: Yes, that's
21 varying.

22 Q. BY MS. SILVERSTEIN: Okay. Is
23 that -- when you said "temporal variability"
24 in your report, were -- did you mean
25 something like 10 micrograms per liter?

1 MS. BAUGHMAN: Objection.

2 Form.

3 Why don't you show him where in
4 your report you're using that phrase
5 so he can tell you what it means.

6 MS. SILVERSTEIN: He's used
7 "temporal variability" multiple times
8 and has read it. I'm asking his
9 understanding of how he described
10 that --

11 MS. BAUGHMAN: Well, since
12 he's --

13 MS. SILVERSTEIN: -- in his
14 work.

15 MS. BAUGHMAN: -- in different
16 contexts at different times, you
17 should show him what sentence you're
18 asking for clarification.

19 Q. BY MS. SILVERSTEIN: When you
20 said "temporal variability" -- I'm not asking
21 about clarification for a specific sentence.

22 When you said "temporal
23 variability" in your report, did you mean
24 multiple different things?

25 MS. BAUGHMAN: Objection.

1 Form.

2 THE WITNESS: No.

3 Q.

4 MS. SILVERSTEIN: Okay.

5 THE WITNESS: But there's
6 obviously a degree of variability.

7 Q. BY MS. SILVERSTEIN: Okay. And
8 in your opinion, in your work, what does that
9 mean?

10 MS. BAUGHMAN: Objection.

11 Form.

12 THE WITNESS: Temporal
13 avail- -- temporal variability? What
14 that means? That means that at a
15 specific location, it's not constant.

16 Q. BY MS. SILVERSTEIN: Okay. So
17 any kind of change --

18 A. Over -- over time.

19 Q. Any kind of change over time?

20 A. Yeah. Those could be small,
21 those could be -- they -- they could be
22 large.

23 Q. Okay. A few minutes ago you
24 said the temporal variability could be due to
25 differences in analytical techniques.

1 Do you remember that?

2 A. Yes.

3 Q. What do you mean "differences
4 in analytical techniques"?

5 A. Depending on how the lab
6 analyzed the sample.

7 Q. Okay. Could there be multiple
8 correct -- scientifically correct ways to
9 analyze a sample?

10 A. That's possible.

11 Q. Would multiple scientifically
12 correct ways to analyze a sample -- the same
13 sample result in different sample results?

14 A. That is possible.

15 Q. Okay. What different
16 analytical techniques to analyze a sample
17 result are you aware of?

18 A. I would say that's generally
19 out of my area of expertise.

20 Q. Okay. Do you consider what
21 analytical technique was used to interpret a
22 sample when you are working on your models?

23 MS. BAUGHMAN: Objection.

24 Form.

25 THE WITNESS: That's -- that's

1 generally out of my area of expertise,
 2 and so when I'm getting lab report --
 3 when I'm getting lab data back, I make
 4 sure that those professionals that
 5 understand the analysis and that check
 6 the analysis and make sure that the
 7 correct lab testing was done and that
 8 those -- those numbers get
 9 quality-checked when they come to me.

10 Q. BY MS. SILVERSTEIN: Okay. Did
 11 you review the, like, lab reports of the
 12 samples for the observed PCE concentrations
 13 at the monitoring wells listed here?

14 A. No.

15 Q. You also identified extreme
 16 hetero -- heterogeneity --

17 A. Heterogeneity.

18 Q. Heterogeneity, thank you.

19 A. It's okay.

20 Q. -- and aquifer properties as
 21 something that could lead to temporal
 22 variability; is that right?

23 A. Correct.

24 Q. What does extreme
 25 heterogeneity, what does that mean?

1 A. Yeah. It probably -- the best
2 way to describe it is to look at our rebuttal
3 report and the Figure 2. But heterogeneity
4 means basically it's not the same.

5 The -- the porous media and the
6 water that flows through the porous media is
7 not the same and uniform. And so as
8 contaminants are getting carried by the water
9 through the porous media, that -- that can
10 vary widely.

11 And so that's generally a
12 spatial difference. So you could have a
13 monitoring well, two monitoring wells fairly
14 close together and get widely different
15 answers.

16 Q. Okay. Is that something that
17 you look at when -- whether -- whether
18 there's extreme heterogeneity --
19 heterogeneity or not? Is that something that
20 you consider when working on a -- a
21 groundwater model?

22 A. Correct.

23 MS. BAUGHMAN: Objection.

24 Form.

25 THE WITNESS: Correct.

1 Q. BY MS. SILVERSTEIN: Okay.
2 Okay. I want to talk about the pumping
3 schedules that you -- you considered.

4 As we discussed earlier, you
5 considered pumping history when working on
6 the post-audit; right?

7 A. Considered? What do you mean?

8 Q. Pumping history was one of
9 the -- the parameters used in your
10 post-audit; right?

11 A. Correct.

12 Q. And is it your understanding
13 that ATSDR assumed that after entering
14 service, wells operated continuously unless
15 they were documented as offline?

16 MS. BAUGHMAN: Objection.

17 Form. Asked and answered.

18 THE WITNESS: It -- in -- in
19 the original model?

20 MS. SILVERSTEIN: Yes.

21 THE WITNESS: Yes.

22 Q. BY MS. SILVERSTEIN: Would you
23 expect the wells at Tarawa Terrace to need
24 maintenance?

25 A. Yes.

1 Q. Okay. It would be fair to say
2 that the wells wouldn't be operating during a
3 maintenance period; right?

4 A. Correct.

5 Q. Would you expect that every
6 period of maintenance was documented in --
7 was documented?

8 MS. BAUGHMAN: Objection.

9 Form.

10 THE WITNESS: Would I assume
11 that it was documented? No, I would
12 not assume that.

13 Q. BY MS. SILVERSTEIN: Okay.
14 Were you aware that there was an expert panel
15 on the Camp Lejeune water modeling in
16 March 2005?

17 A. Yes, I was aware.

18 Q. Did you review the transcript
19 of that expert panel in preparing your
20 reports?

21 A. No.

22 Q. Do you know why ATSDR modeled
23 wells as always pumping unless known to be
24 off?

25 MS. BAUGHMAN: Objection.

1 Form.

2 THE WITNESS: From my
3 experience, that's pretty standard.

4 Q. BY MS. SILVERSTEIN: Okay. And
5 you reviewed the expert panel in preparing
6 your rebuttal report; is that right?

7 A. The 2005? I don't recall.

8 Q. Okay.

9 A. We may have some quotes from
10 there, but I don't remember reading it cover
11 to cover.

12 Q. Okay. How did you determine
13 which quotes to use?

14 MS. BAUGHMAN: Objection.

15 Form.

16 THE WITNESS: I don't recall.

17 Q. BY MS. SILVERSTEIN: You
18 reviewed the 2009 expert panel in preparing
19 your rebuttal report?

20 A. I'm all --

21 MS. BAUGHMAN: You can look at
22 the report, if you want to, to answer.

23 THE WITNESS: I don't have
24 that.

25 MS. BAUGHMAN: The rebuttal?

1 She didn't mark that?

2 THE WITNESS: No, the --

3 MS. SILVERSTEIN: It's marked
4 as Exhibit 3. If you could turn to --

5 THE WITNESS: Oh, the rebuttal.

6 MS. SILVERSTEIN: -- Page 3-7
7 of your rebuttal report. Okay.

8 THE WITNESS: 3-7? Okay.

9 Q. BY MS. SILVERSTEIN: Okay. And
10 so did you review the 2009 expert panel?

11 A. Not cover to cover.

12 Q. How did you determine what
13 parts to review?

14 MS. BAUGHMAN: Objection.
15 Form. Asked and answered.

16 THE WITNESS: To my
17 recollection, we -- we were looking
18 for just specific -- we were looking
19 at specific arguments or statements
20 that were set, but I did not read that
21 report cover to cover.

22 Q. BY MS. SILVERSTEIN: You said
23 that it's standard to assume that the well --
24 the well was pumping unless documented as out
25 of service; right?

1 A. Generally, yes.

2 Q. Why is that considered
3 standard?

4 A. Because you don't have any
5 information otherwise.

6 Q. Would it be a conservative
7 assumption to assume that the wells are
8 pumping unless documented otherwise?

9 MS. BAUGHMAN: Objection.
10 Form.

11 THE WITNESS: I would not use
12 the word "conservative."

13 Q. BY MS. SILVERSTEIN: Why not?

14 A. That's not a word I would
15 describe pumping and continuous pumping.

16 Q. Okay. How would you describe
17 that assumption, the assumption that the
18 wells are pumping unless documented as off?

19 MS. BAUGHMAN: Objection.
20 Form. Asked and answered.

21 THE WITNESS: Standard.
22 Standard approach, standard protocol.

23 Q. BY MS. SILVERSTEIN: Okay. Is
24 it typical to have more wells pumping than
25 are needed to meet user demand?

1 MS. BAUGHMAN: Objection.

2 Form.

3 THE WITNESS: I -- the pumping
4 schedules are going to be -- are going
5 to be totally dependent on the
6 municipality and the person or --
7 usually it's some person that's --
8 that's overseeing the water supply.

9 Q. BY MS. SILVERSTEIN: Okay.
10 Would it -- would you agree that having more
11 wells pumping than is necessary to meet
12 demand would create redundancy?

13 A. Redundancy in what way?

14 Q. It would mean that there's
15 more -- more wells are being used and
16 operated than are necessary?

17 MS. BAUGHMAN: Objection.

18 Form.

19 THE WITNESS: Again, that's
20 going to vary municipality to
21 municipality. It would be up to
22 the -- the operator to determine how
23 much water was needed and how much
24 water was going to be stored.

25 Q. BY MS. SILVERSTEIN: Did you --

1 what did you review that provided information
2 about the Camp Lejeune policy on pumping more
3 water than is necessary?

4 MS. BAUGHMAN: Objection.

5 Form.

6 THE WITNESS: Did not read
7 anything in that regard.

8 Q. BY MS. SILVERSTEIN: Okay.
9 Would it be fair to say that the data
10 indicating the pumpage rate at individual
11 Tarawa Terrace water supply wells was not
12 available for ATSDR's initial model?

13 MS. BAUGHMAN: Objection. Form
14 and foundation.

15 THE WITNESS: Okay. Can you
16 ask -- ask that question again?

17 Q. BY MS. SILVERSTEIN: Sure.
18 You would agree that the
19 data -- the data points for the pumping rate
20 for the individual Tarawa Terrace water
21 supply wells wasn't available to ATSDR when
22 they did their model; right?

23 MS. BAUGHMAN: Objection. Form
24 and foundation.

25 THE WITNESS: That's my

1 understanding.

2 Q. BY MS. SILVERSTEIN: Okay. And
3 if you could go to Chapter C, which is
4 Exhibit 7, and turn to Page C70.

5 Page C70 has Table C3.1, which
6 is titled "Capacity and operational history
7 of water-supply Well TT-26 Tarawa Terrace
8 Marine Corps Base Camp Lejeune,
9 North Carolina"; is that right?

10 A. Correct.

11 Q. And you'd agree that there are
12 18 entries here?

13 A. Correct.

14 Q. So then you would agree that
15 the data for the well capacity and
16 operational history is limited to 18 entries
17 over the 40-year model time period?

18 MS. BAUGHMAN: Objection. Form
19 and foundation.

20 THE WITNESS: Based on this --
21 what's being reported in this table,
22 yes.

23 Q. BY MS. SILVERSTEIN: And you're
24 not aware of any data points that are not
25 included in this table?

1 MS. BAUGHMAN: Same objections.

2 THE WITNESS: Correct.

3 Q. BY MS. SILVERSTEIN: I notice
4 that you highlighted something in the
5 exhibit. What did you highlight?

6 A. Just highlighted the table and
7 that it was reporting TT-26.

8 Q. Another piece of data that you
9 used in your post-audit was the mass loading
10 data; is that right?

11 A. Correct.

12 Q. In the -- in ATSDR's MT3DMS
13 simulation, this -- the -- the spill at ABC
14 Cleaners was simulated using a mass loading
15 rate of 1,200 gallons per day; right?

16 A. 1,200 what?

17 Q. Gallons per day.

18 A. No.

19 Q. What was it?

20 A. Let's turn to the --

21 Q. Well, so do you know what the
22 mass loading rate that ATSDR simulated was?

23 A. It was 1200, but it's not
24 gallons per day.

25 Q. Okay.

1 A. So we can -- we can -- turn to
2 that page.

3 Q. Grams per day, I'm sorry.
4 Is it grams -- that's grams per
5 day?

6 A. Yes.

7 Q. Okay. And that was in a single
8 cell from January 1953 to December 1983;
9 right?

10 A. Correct.

11 Q. For the extended simulation or
12 post-audit that you did, you didn't change
13 the mass loading rate, did you?

14 A. No.

15 Q. What did you do to verify that
16 the mass loading rate was correct?

17 A. Nothing.

18 Q. Do you know what -- and you
19 also used a start date of January 1953.

20 Did you assume that date was
21 correct?

22 A. Yes.

23 Q. Do you know what the
24 January 1953 date is based on?

25 A. I'm assuming that it was when

1 the ABC Cleaners began operations.

2 Q. And do you know what the
3 12,000 -- or 1,200 -- excuse me -- grams per
4 day was based on?

5 A. It was a number that came
6 through the calibration of the model.

7 Q. Did you review the expert
8 report by Dr. Spiliotopoulos?

9 A. I did.

10 Q. Did you review the report by
11 Dr. Jay Brigham?

12 A. I briefly went through it. It
13 didn't really have anything to do with our
14 work.

15 Q. When you were reviewing either
16 Dr. Spiliotopoulos' report or Dr. Brigham's
17 report, did you see their discussion of the
18 ABC Cleaner's opening date?

19 A. Yes.

20 Q. Would it be fair to say that
21 changing the date that mass -- the mass
22 loading began from January 1953 to 1954 could
23 change the model results?

24 MS. BAUGHMAN: Objection.

25 Form.

1 THE WITNESS: It could. And in
2 our evaluation, it made very little
3 difference.

4 Q. BY MS. SILVERSTEIN: Did you
5 change the mass loading date in any of your
6 simulations?

7 A. During the rebuttal report
8 phase, yes.

9 Q. Would it be fair to say that if
10 the start date of the ABC Cleaner spill was
11 later than January 1953, that could mean that
12 the PCE reached the supply wells at a later
13 date?

14 MS. BAUGHMAN: Objection.
15 Form.

16 THE WITNESS: As I stated, it
17 made very little difference.

18 Q. BY MS. SILVERSTEIN: Does that
19 mean that it could change the date that the
20 PCE reached the supply wells?

21 MS. BAUGHMAN: Objection.
22 Form.

23 THE WITNESS: Yes, it could.

24 Q. BY MS. SILVERSTEIN: Do you
25 have any reason to believe that

1 Dr. Spiliotopoulos or Dr. Brigham is
2 incorrect in their discussion of the opening
3 date of ABC Cleaners?

4 MS. BAUGHMAN: Objection. Form
5 and foundation.

6 THE WITNESS: Do I --

7 MS. BAUGHMAN: Outside the
8 scope.

9 THE WITNESS: Yeah, I don't
10 have an opinion of what they think or
11 know.

12 Q. BY MS. SILVERSTEIN: Okay. You
13 don't have an opinion as to whether the date
14 that ABC Cleaners opened was in 1953 or 1954?

15 MS. BAUGHMAN: Same objections.

16 THE WITNESS: Yeah, I have -- I
17 have no -- I'm -- I'm doing my work
18 based on what was reported in the
19 original document.

20 Q. BY MS. SILVERSTEIN: Okay. And
21 you didn't do anything to verify the mass
22 loading start date that was used in the ATSDR
23 document?

24 A. Correct.

25 Q. What did you do to verify the

1 rate of 1,200 grams per day through
2 December 1983?

3 MS. BAUGHMAN: Objection. Form
4 and foundation. Asked and answered.

5 THE WITNESS: No. We -- we
6 didn't -- we just took the numbers
7 that were given to us in the report.

8 Q. BY MS. SILVERSTEIN: Okay. You
9 assumed that ATSDR was correct in that?

10 A. Correct.

11 Q. Okay. If the rate is
12 different -- was different than 1,200 grams
13 per day for some or all of the dates from
14 1953 to 1987, would -- could that change the
15 concentration -- the simulated concentration
16 results?

17 A. Yes, that's possible.

18 MS. SILVERSTEIN: Okay. I
19 think we've been going for over an
20 hour, so this would be a good time for
21 a break.

22 THE VIDEOGRAPHER: We're off
23 the record. The time is 2:06.

24 (There was a break taken.)

25 THE VIDEOGRAPHER: We're back

1 on the record. The time is 2:27.

2 This is Media Number 4.

3 Counsel may proceed.

4 Q. BY MS. SILVERSTEIN: Mr. Davis,
5 did you talk to the attorneys about the
6 substance of your testimony while you were on
7 break?

8 A. No.

9 Q. Right before the break we were
10 talking about the mass loading -- the mass
11 loading date -- data that you used.

12 Do you remember that
13 conversation?

14 A. Yes.

15 Q. And you accepted ATSDR's
16 determination that 1200 grams per day was the
17 mass loading rate?

18 A. Correct.

19 Q. Is it reasonable to assume that
20 the first day that ABC Cleaners spilled PCE
21 into the water, the mass loading rate was
22 1200 grams per day?

23 A. That's the assumption.

24 Q. And is that, in your opinion, a
25 reasonable assumption?

1 A. Yes.

2 Q. Would that assumption take into
3 account the time it takes for the PCE to get
4 to the aquifer?

5 MS. BAUGHMAN: Objection.

6 Form.

7 THE WITNESS: By putting 1200
8 in, the model is going to interpret
9 that as -- as an immediate -- an
10 immediate source starting on that day.

11 Q. BY MS. SILVERSTEIN: Okay. And
12 it would be fair to say that the PCE has to
13 move from ABC Cleaners to the aquifer; right?

14 MS. BAUGHMAN: Objection.

15 Form.

16 THE WITNESS: Yes, that's the
17 physical process.

18 Q. BY MS. SILVERSTEIN: Because
19 ABC Cleaners weren't dumping PCE into the
20 aquifer itself; right?

21 A. That's my understanding.

22 Q. And on the day that the PCE was
23 first spilled by ABC Cleaner, do you think
24 that it's reasonable to assume 1200 grams of
25 PCE would, on the same day, get to the

1 aquifer?

2 MS. BAUGHMAN: Objection.

3 Form.

4 THE WITNESS: We -- we don't

5 know.

6 Q. BY MS. SILVERSTEIN: Does -- as
7 the PCE moved to the aquifer, some of it
8 would volatilize; right?

9 A. It's possible.

10 Q. Does the mass loading rate take
11 into account the volatilization?

12 A. Yes.

13 Q. How so?

14 A. Because that mass rate was
15 calculated through a -- an effort of
16 calibration to say this is what we -- through
17 calibration, this is the mass loading number
18 that we're going to use to match what we're
19 measuring in the -- in the field at the
20 observation points.

21 Q. How -- what was the
22 volatilization rate that ATSDR used in their
23 calibration?

24 MS. BAUGHMAN: Objection.

25 Form.

1 THE WITNESS: There's no such
2 volatilization rate.

3 Q. BY MS. SILVERSTEIN: Okay. How
4 did they determine how much of the PCE would
5 volatilize?

6 MS. BAUGHMAN: Objection. Form
7 and foundation.

8 THE WITNESS: They didn't, is
9 my understanding. My understanding is
10 they came up with the 1200 number
11 through a calibration effort.

12 Q. BY MS. SILVERSTEIN: Okay. The
13 amount of PCE that volatilized depends on --
14 would depend on soil conditions?

15 A. That's part of it.

16 Q. Right. And it could depend on
17 the temperature?

18 A. That's part of it.

19 Q. And on the precipitation rate?

20 A. Yes.

21 Q. Okay. And the temperature at
22 Camp Lejeune would change over the -- from
23 1953 to 1987; right?

24 A. I would assume so.

25 Q. And the precipitation wasn't

1 the same every day during that time period?

2 A. That's my understanding.

3 Q. Okay. And ATSDR didn't change
4 the mass loading based on the temperature;
5 right?

6 A. No. The number that they used
7 was a constant number through that time
8 period which was derived through their
9 calibration efforts.

10 Q. Okay. And to your knowledge --
11 well, and that constant number didn't vary at
12 all depending on the precipitation or outside
13 temperature, did it?

14 A. No. It was in the model. It
15 was a constant 1200 through that time frame.

16 Q. Okay. And in your opinion,
17 would the constant of 1200 -- does that --
18 would that be what the real-world conditions
19 show, that it's the same every single day?

20 A. With --

21 MS. BAUGHMAN: Objection.

22 Form.

23 THE WITNESS: Without
24 additional information, that would be
25 a standard practice.

1 Q. BY MS. SILVERSTEIN: Okay. And
2 by "standard practice," do you mean that
3 that's a standard assumption?

4 A. No. Standard practice in a
5 modeling effort, unless you have it and
6 information to -- to suggest otherwise,
7 you're going to assume that that was the mass
8 loading rate.

9 Q. Did ATSDR choose the mass
10 loading rate that it needed to fit the data
11 from the 1980s?

12 A. That was part of the
13 calibration effort, correct.

14 Q. Would it be accurate to say
15 that you are not offering any opinions on how
16 the contaminants moved from Model Layer 1 to
17 other layers?

18 MS. BAUGHMAN: Objection.
19 Form.

20 THE WITNESS: I -- we did not
21 offer that opinion, no.

22 Q. BY MS. SILVERSTEIN: Okay. If
23 you could go to Chapter F, which is
24 Exhibit 8, and turn to Page F12.

25 And I want to look at the

1 paragraph on the right-hand side of the page.
2 It says "ABC One-Hour Cleaners always used
3 PCE in its dry cleaning operations, beginning
4 during 1953 when the business opened. A
5 primary pathway of contaminants from the
6 dry-cleaning operation at ABC One-Hour
7 Cleaners to the soil and subsequently to the
8 groundwater was apparently through a septic
9 tank soil absorption system to which
10 ABC One-Hour Cleaners discharged waste and
11 wastewater."

12 Did I read that correctly?

13 A. Yes.

14 MS. BAUGHMAN: You left off the
15 source of the 1953, the deposition of
16 Mr. Melts, the owner. You didn't read
17 that.

18 THE WITNESS: Yeah, she started
19 with "A primary pathway."

20 MS. BAUGHMAN: No, she started
21 with the first sentence.

22 THE WITNESS: Oh, okay, yeah,
23 my fault.

24 Q. BY MS. SILVERSTEIN: Did I read
25 that correctly? Are you following where I'm

1 reading that?

2 A. Yeah. Could you read it again.

3 Q. Sure. "ABC One-Hour Cleaners
4 always used PCE in its dry-cleaning operation
5 beginning during 1953 when the business
6 opened." Then cites a deposition. "A
7 primary pathway of contaminants from the
8 dry-cleaning operations at ABC One-Hour
9 Cleaners to the soil and subsequently to
10 groundwater was apparently through a septic
11 tank soil absorption system to which
12 ABC One-Hour Cleaners discharged waste and
13 wastewater."

14 Did I read that correctly?

15 A. Yes.

16 Q. And if you skip down a couple
17 lines, it says "In addition, spent PCE was
18 routinely reclaimed using a
19 filtration-distillation process that" was
20 produced -- "that produced dry 'still
21 bottoms' which until about 1982" -- again a
22 citation -- "or 1984/1985 were disposed of
23 onsite generally by filling potholes in a
24 nearby alleyway"; is that correct?

25 A. Yes.

1 Q. Okay. And I see you're
2 highlighting something.

3 What are you highlighting?

4 A. Just the parts that you're
5 reading.

6 Q. Okay. Did you highlight
7 anything other than what I read out loud?

8 A. No.

9 Q. So then you would agree that
10 ATSDR called the septic tank soil absorption
11 system a primary pathway of contaminants from
12 the dry cleaning operations?

13 A. That's what they wrote,
14 correct.

15 Q. And you'd agree that ATSDR
16 assumed that the spillways was disposed of
17 outside until either 1982 or 1984/1985;
18 right?

19 MS. BAUGHMAN: Objection.
20 Form.

21 THE WITNESS: That's what they
22 wrote.

23 Q. BY MS. SILVERSTEIN: If the end
24 date of ABC Cleaners' PCE outside solid waste
25 disposal or drain pipe is earlier than the

1 day ATSDR assumed, could that change the
2 simulated concentrations?

3 MS. BAUGHMAN: Objection. Form
4 and foundation.

5 THE WITNESS: Yes, that is
6 possible.

7 Q. BY MS. SILVERSTEIN: Would you
8 agree that changes in ABC Cleaner's disposal
9 system would change the mass loading rate?

10 MS. BAUGHMAN: Objection.
11 Form. Foundation.

12 THE WITNESS: Yes. That could
13 have an impact on the -- on the mass
14 loading rate.

15 Q. BY MS. SILVERSTEIN: In your
16 extended simulation or post-audit, you didn't
17 account for possible changes to the mass
18 loading data; right?

19 MS. BAUGHMAN: Objection.
20 Form.

21 THE WITNESS: It had already
22 stopped. In our extension, there was
23 no mass loading.

24 Q. BY MS. SILVERSTEIN: Right.
25 And you didn't account for any changes in

1 that most -- mass loading rate when you were
2 doing the post-audit; right?

3 MS. BAUGHMAN: Objection.
4 Form.

5 THE WITNESS: Correct.

6 Q. BY MS. SILVERSTEIN: You can go
7 ahead and set Exhibit 8 aside.

8 And I want to go back to your
9 report to Page 5-1.

10 A. The original one?

11 Q. Yes.

12 You would agree that when
13 simulating the migration of PCE, it can be
14 challenging to achieve a close match between
15 the simulated results and the observed
16 results; is that right?

17 A. Sorry, I was looking at the
18 wrong one.

19 Q. That's okay. I'm not pointing
20 you to a specific point right now.

21 A. Okay. Can you ask the question
22 again?

23 Q. Sure.

24 You'd agree that when
25 simulating the migration of a PCE contaminant

1 plume, it can be difficult or challenging to
2 achieve a close match between the simulated
3 and observed concentrations; right?

4 A. Correct.

5 Q. Why would it be difficult to --
6 or challenging to achieve a close match
7 between the simulated and observed
8 concentrations?

9 A. I think we addressed this in
10 the report, but it's -- with a transport,
11 it's difficult because the observations vary.
12 Sometimes they're close together, sometimes
13 they vary in time, and so trying to match
14 that at a specific point or a specific
15 location, that can be a challenge.

16 Q. And on Page 5-1 in your report,
17 the last full paragraph, it starts with
18 "Given."

19 Do you see that?

20 A. Yes.

21 Q. And it says "Given these
22 challenges, it is important to qualitatively
23 assess the overall behavior of the simulated
24 plume in addition to quantitatively analyzing
25 the differences in simulated and observed

1 concentrations at specific times and
2 locations."

3 Did I read that correctly?

4 A. Yes.

5 Q. And I saw you highlighted
6 again. Did you highlight what I read out
7 loud?

8 A. Yes, yep.

9 Q. Did you highlight anything
10 else?

11 A. No.

12 Q. And so is my understanding that
13 in order to assess the overall plume
14 behavior, you overlaid the residual area --
15 errors for the observation points with plume
16 maps at multiple model layers; is that right?

17 A. Yeah. And that's in that
18 report in the end.

19 Q. And would it be -- and it --
20 you did that to look to see if the trends in
21 how the plume moved were similar?

22 A. Basically to -- to fulfill this
23 qualitative assessment.

24 Q. Okay. What specifically were
25 you looking for, for that qualitative

1 assessment?

2 A. Looking at the shape of the
3 plume and the -- the concentrations that --
4 from the observations and where they fell
5 within those different layers within the
6 plume or without the plume -- you know,
7 outside of the plume.

8 Q. Okay. Is it correct that you
9 were looking to see if, like, the shape of
10 the plume moved in the same way as -- moved
11 in the same way?

12 A. In the same way as what?

13 Q. So when you -- it sounded like
14 you said you were looking at, like, the shape
15 of the plume, right, as one of the -- for
16 the -- part of the qualitative assessment?

17 A. No. The qualitative is the --
18 the shape of the plume compared to the
19 observation points and where they are and
20 what their -- how -- how well the computed
21 versus observed plotted together to help us
22 understand that qualitatively.

23 Q. Okay. How -- what were you
24 looking for to see if it was a close match?

25 A. If you look at the figures,

1 we're looking at each of those observation
2 points and what their mean error is and where
3 they are in relationship to the plume.

4 Q. Okay. Would -- to do this kind
5 of qualitative assessment, would you be
6 looking to see if the simulated and observed
7 datas over three months, for example, both
8 increased and then the next three months both
9 decreased?

10 A. No.

11 Q. Okay. How would you compare
12 that then?

13 A. Just -- well, what we did in
14 the report is we looked at different times
15 for different model layers where the
16 observation points were and then plotted that
17 up and then looked at those at the different
18 times and at the different layers and how
19 well they -- how well they matched.

20 Q. And by "matched" do you mean
21 whether the concentration result was close or
22 do you mean something else?

23 A. The residual. The difference
24 between the computed versus observed and
25 where it was located in regards to the -- the

1 plume extents.

2 Q. In your rebuttal report, you
3 discussed Dr. Spiliotopoulos' critiques of
4 your qualitative assessment; right?

5 A. Correct.

6 Q. And you would agree that data
7 are not available to evaluate whether the
8 overall extents of the simulated plume are
9 realistic?

10 MS. BAUGHMAN: Objection.

11 Form.

12 THE WITNESS: Can you ask that
13 question again.

14 Q. BY MS. SILVERSTEIN: Sure.

15 Is there data available to
16 evaluate whether the extent of the simulated
17 plume is realistic?

18 MS. BAUGHMAN: Objection.

19 Form.

20 THE WITNESS: No.

21 Q. BY MS. SILVERSTEIN: And you
22 believe that it's okay to not have
23 observations of the plume covering the entire
24 modeling domain; right?

25 A. As I said earlier, you want as

1 much data as possible and then you have to --
2 you have to work with what data you have.

3 Q. Would it be impractical --
4 impractical to have observations for the
5 entire modeling domain?

6 A. Like every foot, or what?

7 Q. Sure.

8 A. Every foot seems impractical to
9 me.

10 Q. Okay. And what would you
11 consider having enough observations to draw a
12 comparison?

13 A. Whatever you --

14 MS. BAUGHMAN: Objection.

15 Form.

16 THE WITNESS: -- can get.

17 Whatever you can get.

18 Q. BY MS. SILVERSTEIN: Would you
19 consider it enough if you only had one
20 observation?

21 MS. BAUGHMAN: Objection.

22 Form.

23 Enough for what? And comparing
24 what to what? I don't understand the
25 question. Object to the form.

1 THE WITNESS: Yeah, can you
2 explain?

3 Q. BY MS. SILVERSTEIN: Sure.

4 You're talking about comparing
5 the simulated data to the model data to see
6 if it is a good match; right?

7 A. On the -- on the qualitative?

8 Q. On the qualitative.

9 A. Correct.

10 Q. Okay. If you only had one
11 observed data point, would you be able to
12 determine whether or not the simulated data
13 was a good match?

14 A. It would be more difficult.

15 Q. Why would it be more difficult?

16 A. Because you're basing your
17 assumptions on one single location.

18 Q. Okay. I want to go through
19 your rebuttal report to Figure A5.

20 Did you create this figure?

21 A. My -- my staff did.

22 Q. What does this figure show?

23 A. This shows for June 1997 we're
24 looking at Model Layer 1 and 3 and 5, and
25 we're plotting the PCE concentrations for all

1 of the model layer cells in each of those
2 three layers as depicted by the green, blue,
3 orange, red, and brown color; and then
4 superimposed on that are the observation
5 points for each of those three layers.

6 And we colored those individual
7 observation points either green, yellow, red,
8 or purple based on what the absolute error
9 was between the computed versus observed for
10 that particular location.

11 Q. Model 1 is on the -- is the
12 left-hand side square or --

13 A. Correct.

14 Q. -- rectangle?

15 A. Correct.

16 Q. Okay.

17 MS. BAUGHMAN: It's Model
18 Layer 1.

19 Q. BY MS. SILVERSTEIN: ABC
20 Cleaners is identified on this map as the red
21 square?

22 A. That's correct.

23 Q. Okay. How did the -- what was
24 the direction of the groundwater flow on this
25 map?

1 A. You can infer that by the blue
2 lines, which are what we call the piezometric
3 or the -- the groundwater contours. So in
4 this, it's going in a southeastern direction,
5 more or less.

6 Q. Okay.

7 A. The flow would go basically
8 perpendicular to those blue lines.

9 Q. Okay. And when you say "a
10 southeastern direction," so that I make sure
11 that I'm oriented correctly, the top --

12 A. This is going north.

13 Q. -- would be north; right?

14 A. Correct.

15 Q. And so southeastern direction
16 would be like in the direction towards the
17 left-hand corner; is that right?

18 A. No. The bottom right-hand
19 corner.

20 Q. The bottom right-hand corner.
21 I had that right in my brain and said it
22 out -- wrong out loud.

23 A. That's okay.

24 Q. Okay. Southeast would be going
25 towards the bottom right-hand corner?

1 A. Correct.

2 Q. Okay. And some of the samples
3 were taken, like, upgradient or to the
4 northwest of ABC Cleaners; is that right?

5 A. Correct. Like S-11 or S-1 or
6 S-6.

7 Q. Under what conditions would
8 contaminants travel upgradient?

9 A. Generally, you only see that
10 under numerical dispersion or dispersion
11 phenomenon. So when -- and -- and diffusion,
12 but that's really small, so you can get
13 contaminants moving upgradient due to
14 dispersion.

15 Q. Okay.

16 A. And you can kind of see that in
17 this case because you can see that there's
18 contours. The blue and the green are
19 upgradient from the ABC location.

20 Q. Okay. So when I say -- like,
21 wonder what conditions could contamination
22 travel upgradient, would you look, for
23 example, at, like, the soil conditions?

24 A. Sure, that plays a part in it.

25 Q. Okay. And would you look at

1 the precipitation in the area?

2 A. That doesn't really have
3 anything -- that doesn't.

4 Q. Okay. When you're looking --
5 when you say the soil could play a role in
6 it, are there other factors in a site that
7 would play a role in whether a contamination
8 travels upgradient?

9 A. No. In -- it -- it's just --
10 it's a component of fate and transport, and
11 so if you're going to model it, then you're
12 going to look at the plume characteristics,
13 generally, is what you're going to look at.
14 So I'm sure the soil, the ma- -- soil matrix
15 plays a part in it, but --

16 Q. Okay.

17 A. -- it's just a phenomenon
18 that -- that -- how contaminants travel in
19 the ground.

20 Q. Okay.

21 A. But the vast majority travels
22 downgradient because it's carried by the
23 water.

24 Q. How far upgradient would PCE be
25 able to travel?

1 A. It's totally going to be
2 site-dependent.

3 Q. Okay. Did you investigate the
4 site conditions to determine how far
5 upgradient PCE could travel in -- at the --
6 in Tarawa Terrace?

7 A. We did not do anything with the
8 dispersion coefficients or -- we didn't
9 change any of that or look into it or
10 evaluate it or critique it.

11 Q. Okay. Do you know how many
12 samples were taken from wells or locations
13 upgradient from ABC Cleaners?

14 A. I could look because that
15 would -- that's in the table. So I could
16 count them, but that would be -- that would
17 be part of the table here of the
18 concentrations over time, so I don't know
19 that number -- specific number offhand.

20 Q. Okay. Would a groundwater
21 model generally account for the direction of
22 groundwater flow?

23 MS. BAUGHMAN: Objection to
24 form.

25 THE WITNESS: The -- the model,

1 the -- based on your boundary
2 conditions and stresses, would
3 determine the groundwater flow.

4 Q. BY MS. SILVERSTEIN: Okay. And
5 does that include which direction the
6 groundwater is flowing?

7 A. Yeah. The gradient, yeah.

8 Q. Okay. I want to go to
9 Figure A9. And this model -- this figure --
10 well, first, did you create this figure?

11 A. My staff did.

12 Q. Okay. This figure shows the
13 simulated PCE concentrations for three model
14 layers, Layer 1, Layer 3, and Layer 5,
15 compared to measured values; is that right?

16 A. Yeah, for March 2008.

17 Q. And it looks like Well C5 is
18 towards the middle of the simulated PCE
19 plume; is that right?

20 A. In Layer 3?

21 Q. In Layer 3.

22 A. Yes.

23 Q. Well C5's observed
24 concentrations were all below the detection
25 limit; right?

1 A. I'd have to look at the
2 documents, but --

3 Q. Sure. If you turn to rebuttal
4 Table A1.

5 A. Okay.

6 Q. The PCE observed concentration
7 value for Well C5 is below the detection
8 limit.

9 A. Okay.

10 Q. Is that correct?

11 A. That's correct.

12 Q. But the simulated -- the
13 calibrated model simulated high PCE
14 concentrations for monitoring Well C5; is
15 that right?

16 A. For the cell, the model cell
17 that C5 was located in, correct.

18 Q. And the -- your extended model
19 or proposed audit also simulated high PCE
20 values for monitoring Well C5; correct?

21 A. Yeah. These are our -- these
22 are our results in Table A1.

23 Q. How -- can you explain how that
24 discrepancy would occur between the -- the
25 observed data and the simulated results for

1 Well C5?

2 A. Yeah. In this case -- in this
3 particular case it could be a variety of
4 different reasons, but I would say that this
5 is a great case by looking at Model Layer 1
6 and Model Layer 3 that it is difficult to
7 match all of your observations. And in this
8 particular case, for C5 where the plume,
9 where the model's predicting the plume, it
10 does -- it did not match that well, and there
11 could be different reasons for that.

12 Q. When you say there could be
13 different reasons, what reasons could there
14 be?

15 A. Just a heterogeneity of the
16 system could cause the contaminant to flow
17 and not -- not actually go to where C5 was at
18 that exact little spot. That would be one --
19 one answer.

20 Q. Okay. Are there other reasons?

21 A. Again, we talked about earlier
22 about sampling errors. I could have taken a
23 sample and didn't follow protocol. I sent
24 the wrong sample to the lab. The lab did
25 the -- ran the wrong analysis. There's a

1 variety of different things that could happen
2 for -- for -- for C5.

3 Q. Okay. So would you agree that
4 in water modeling, you want to keep the model
5 simple enough to be manageable and useful but
6 complex enough to be representative?

7 A. Correct. That's generally the
8 idea.

9 Q. And so complexity should be
10 built in as needed in that case?

11 A. To the extent that you have
12 data to support it.

13 Q. And you'd agree that in some
14 situations, multiple sets of model input
15 parameters can calibrate to a single set of
16 observed data; right?

17 MS. BAUGHMAN: Objection.
18 Form.

19 THE WITNESS: Yes.

20 Q. BY MS. SILVERSTEIN: And if
21 multiple sets of model input parameters can
22 calibrate to a single set of observed data,
23 that would be nonuniqueness?

24 A. That is correct. That's the
25 word we use.

1 Q. Okay. When a model is
2 nonunique, that means that it may not be the
3 only valid model; right?

4 A. That's one interpretation.

5 Q. If there are multiple model
6 input parameters that can fit the scenes that
7 have observed data, it could make it
8 difficult to determine which set of
9 parameters is -- accurately reflects the real
10 world; right?

11 A. Yes, that's possible.

12 Q. To increase your confidence
13 that a model accurately reflects the real
14 world, you want it to be more unique; would
15 that be fair to say?

16 MS. BAUGHMAN: Objection.
17 Form.

18 THE WITNESS: Ideally, yes.

19 Q. BY MS. SILVERSTEIN: One way
20 that you can make a model more unique is to
21 use more site-specific data for the
22 parameters; is that right?

23 A. Additional observation data
24 helps that, yes.

25 Q. And that additional observation

1 data could be in terms of concentration
2 sample results or other known information
3 about the location of the groundwater?

4 A. Correct.

5 Q. You'd agree that it -- it's
6 impossible to fully characterize and
7 incorporate all parameters and complexities
8 of a real aquifer system into a computer
9 model?

10 A. Yes.

11 Q. Site-specific data means
12 real-world data sets from the location you're
13 modeling; right?

14 A. Correct.

15 Q. And ATSDR had no site-specific
16 data for estimating the distribution
17 coefficient; is that right?

18 MS. BAUGHMAN: Objection.

19 Form. Foundation.

20 THE WITNESS: I don't -- I
21 don't know.

22 Q. BY MS. SILVERSTEIN: Do you
23 know -- are you aware that ATSDR identified
24 the -- a distribution coefficient by
25 reviewing the literature?

1 MS. BAUGHMAN: Objection. Form
2 and foundation. It's outside the
3 scope.

4 THE WITNESS: I don't know.

5 Q. BY MS. SILVERSTEIN: You
6 reviewed Chapter F.

7 A. Yeah.

8 Q. Go ahead and pull back up -- I
9 think it's Exhibit 8. And if you could go
10 ahead and go to Page F28.

11 A. 28?

12 Q. Yes. You would agree -- well,
13 I guess starting on Page F27. Go ahead and
14 flip back one page.

15 And the last paragraph on Page
16 F20 says -- F27 says "Estimates of
17 retardation factors and distribution
18 coefficients for PCE migration within the
19 Tarawa Terrace aquifer or Castle Hayne
20 aquifer are unknown, and initial estimates
21 applied to the MT3DMS model were based on
22 literature sources"; is that right?

23 A. Yes.

24 Q. Okay. And did you just
25 highlight the sentence I read out loud?

1 A. Yes.

2 Q. Did you highlight anything
3 else?

4 A. No.

5 Q. Okay. And going on to
6 Page F28. Sorry, the last sentence of
7 Page F27. It says "Of the approximately 150
8 samples analyzed" and "the distribution
9 coefficient" for -- "the distribution
10 coefficient for sand ranged from 0.25 to
11 0.76 milliliter per gram, an averaged
12 3.9 milliliter per gram"; is that right?

13 MS. BAUGHMAN: Objection.

14 Form.

15 And take your time to read the
16 whole paragraph if you want to --

17 THE WITNESS: No, this is fine.

18 MS. BAUGHMAN: -- or, you know,
19 in the -- to context.

20 THE WITNESS: So we've moved on
21 from -- we're now talking about how
22 retardation factors are created.

23 MS. SILVERSTEIN: Yes.

24 THE WITNESS: And not
25 dispersion; right?

1 MS. SILVERSTEIN: Yes. We
2 weren't talking about dispersion.

3 THE WITNESS: Okay. We're
4 talking --

5 Q. BY MS. SILVERSTEIN: ATSDR
6 reviewed the literature to determine both the
7 retardation factor and the distribution
8 coefficient; right?

9 A. Okay. Sure.

10 Q. Okay. And when they're talking
11 about the literature that they reviewed here,
12 they say "Retardation factors increased
13 directly with increasing time but at a
14 decreasing rate. Hofmann (1995) reported
15 highly controlled laboratory column
16 determinations of distribution coefficients
17 for PCE migration through gravel, sand, and
18 silt. Of the approximately 150 samples
19 analyzed, the distribution coefficient for
20 sand ranged from 0.25 to 0.76 milliliter per
21 gram and averaged 0.39 milliliter per gram";
22 is that right?

23 A. Correct.

24 Q. On the next page, it continues.
25 "Corresponding values for silts ranged from

1 0.21 to 0.71 milliliters per gram, and
2 averaged 0.40 milliliters per gram"; is that
3 right?

4 A. Yes.

5 Q. The final distribution
6 coefficient that ATSDR used was
7 0.14 milliliters per gram?

8 MS. BAUGHMAN: Are you talking
9 about originally or when they
10 corrected it?

11 Q. BY MS. SILVERSTEIN: According
12 to the reports, ATSDR used a distribution
13 coefficient of 0.14 milliliters per gram; is
14 that right?

15 MS. BAUGHMAN: Objection. Form
16 and foundation.

17 This is outside the scope.

18 THE WITNESS: Based on what
19 they wrote here, yes.

20 Q. BY MS. SILVERSTEIN: Okay.
21 You'd agree that 0.14 milliliters per gram is
22 lower than the -- the low end of the range
23 identified for sands, which is
24 0.25 milliliters per gram?

25 MS. BAUGHMAN: Objection. Form

1 and foundation. Outside the scope of
2 his report.

3 And as you know, this was
4 changed and corrected by Mr. Faye.
5 It's just not reflected in the report.

6 THE WITNESS: Okay. I -- I
7 only can go off of what's stated here.
8 They used .14.

9 Q. BY MS. SILVERSTEIN: Okay. And
10 you'd agree that's lower than .25 milliliters
11 per gram; correct?

12 MS. BAUGHMAN: Objection.
13 Form. Foundation. Outside the scope.

14 THE WITNESS: .14 is less than
15 .25.

16 Q. BY MS. SILVERSTEIN: It's also
17 lower than the .21 milliliters per gram
18 identified for silts; right?

19 MS. BAUGHMAN: Same objections.

20 THE WITNESS: .14 is lower.

21 Q. BY MS. SILVERSTEIN: Would it
22 be correct to say that a lower distribution
23 coefficient means the contaminants move more
24 quickly through the water?

25 A. That would be the effect.

1 Q. And if the contaminants are
2 moving more quickly, does that mean that the
3 contaminants would get to the well faster?

4 A. By a small amount.

5 Q. Did you use the same
6 distribution coefficient that ATSDR did?

7 A. 2.9, correct. 2.93.

8 Q. Where did you get 2.93?

9 A. That was what -- the parameters
10 that were in the model. We did not change
11 the bulk density or the distribution
12 coefficient --

13 Q. Okay.

14 A. -- in the original model.

15 Q. And was that distribution
16 coefficient consistent with the reports that
17 ATSDR provided?

18 MS. BAUGHMAN: Objection. Form
19 and foundation.

20 THE WITNESS: We didn't -- we
21 didn't change it, so I'm assuming that
22 it was consistent to the effect that
23 we got the original files, we did not
24 change it, so whatever was in the
25 original files.

1 Q. BY MS. SILVERSTEIN: Okay. So
2 my question's a little bit different.

3 Is that --

4 A. Okay.

5 Q. -- consistent with the -- the
6 reports that ATSDR produced?

7 MS. BAUGHMAN: Objection. Form
8 and foundation and outside the scope.

9 THE WITNESS: I -- I believe
10 the retardation factor was this 2.9
11 that is stated here in this document.

12 Q. BY MS. SILVERSTEIN: Okay. But
13 for the distribution coefficient, which my
14 understanding is the distribution coefficient
15 is part of the retardation factor?

16 A. It's a -- it's one of the
17 variables, and so in the model, the
18 distribution coefficient is this
19 0.00005 cubic feet per gram.

20 Q. Okay.

21 A. That's the number that's in the
22 model.

23 Q. Okay. You can go ahead and set
24 Chapter F aside.

25 You'd agree that ATSDR selected

1 biodegradation rates for the MT3DMS and
2 TechFlow models; right?

3 A. I'm not familiar with the
4 TechFlow model at all.

5 Q. Okay.

6 A. But, yes, biodegradation rate
7 was applied.

8 Q. Okay.

9 A. And then for the MT3DMS model.

10 Q. So, again, on Page F28 --
11 apologies.

12 A. You said we were done.

13 Q. I know. I should have looked
14 ahead at my notes.

15 A. No worries.

16 Q. On Page F28, do you see the
17 header that says "Biodegradation"?

18 A. Yes.

19 Q. And the second -- the second
20 full paragraph on there starts "The PCE
21 concentrations at the water-supply Well TT-26
22 on September 25, 1985, and July 11, 1991,
23 were 1,100 and 350 micrograms per liter,
24 respectively, and the elapsed time was
25 2,151 days. Applying these data points to

1 Equation 3 yields a degradation rate of
2 0.00053 per day"; is that right?

3 A. Correct.

4 Q. So the field data that ATSDR
5 used are the two measurements from
6 September 25, 1985, and July 11, 1991; is
7 that right?

8 MS. BAUGHMAN: Objection. Form
9 and foundation.

10 THE WITNESS: Based on the
11 document here, yes.

12 Q. BY MS. SILVERSTEIN: And you're
13 not aware of any other field data that ATSDR
14 used to determine the biodegradation rate;
15 right?

16 MS. BAUGHMAN: Objection.
17 Outside the scope, form, and
18 foundation.

19 THE WITNESS: Yeah, I don't
20 know.

21 Q. BY MS. SILVERSTEIN: If you go
22 a little bit further down, the sentence that
23 starts on Page F28 and goes on to F29, it
24 says "To the extent that migration of PCE
25 mass toward and away from Well TT-26 occurred

1 at about equal rates from 1985 to 1991, the
2 computed degradation rate of 0.00053 per day
3 approximates a long-term average degradation
4 rate. On the other hand, if a significant
5 quantity of the PCE degraded in the vicinity
6 of Well TT-26 was replaced by advection, then
7 the degradation rate computed using
8 Equation 3 is probably a minimum rate."

9 Did I read that correctly?

10 A. Yes.

11 Q. My understanding is that this
12 means that ATSDR was -- well, my
13 understanding is that this means that the
14 degradation rate calculated from the field
15 data represents a long-term average
16 biodegradation rate at TT-26 only if the PCE
17 mass migration was the same upgradient and
18 downgradient; is that right?

19 MS. BAUGHMAN: Objection. Form
20 and foundation.

21 THE WITNESS: Yeah, I'm not --
22 I -- I couldn't -- I couldn't tell you
23 that.

24 Q. BY MS. SILVERSTEIN: Okay. Did
25 you look at the biodegradation rate for the

1 extended model?

2 A. Yes. We kept it the same, from
3 .0053. So it was .005 is what's -- it's in
4 the model.

5 Q. Okay. And did you consider
6 ATSDR's statement that "To the extent the
7 migration of PCE mass toward and away from
8 Well TT-26 occurred at about equal rates for
9 1985 to 1981, the computed degradation rate
10 of .00053 per day approximates a long-term
11 average degradation rate. On the other hand,
12 if a significant quantity of the PCE degraded
13 in the vicinity of Well TT-26 was replaced by
14 advection, then the degradation rate computed
15 using Equation 3 is probably a minimum rate."

16 Did you consider that
17 statement?

18 A. No. That was outside of our
19 scope.

20 Q. Okay. When you say outside of
21 that -- of your scope, do you mean you
22 weren't asked to determine whether the
23 biodegradation rate was appropriate?

24 A. No, exactly.

25 Q. Okay. You were asked to -- in

1 your extended simulation, did you assume that
2 ATSDR used all the correct input?

3 A. That is correct.

4 Q. And you did that without
5 analyzing or determining whether or not you
6 agreed with those inputs?

7 A. That is correct.

8 Q. If the biodegradation rate were
9 higher than what ATSDR used, would that mean
10 that PCE degraded into TCE, then DCE, then
11 vinyl chloride at a faster rate?

12 A. Correct.

13 Q. And with a higher
14 biodegradation rate, would the PCE
15 concentrations at TT-26 be lower?

16 A. That's not necessarily true.

17 Q. Could they be lower?

18 A. Could be, yeah.

19 Q. If the PCE concentrations at
20 TT-26 were lower, would that mean that the
21 PCE concentrations at the Tarawa Terrace
22 water treatment plant were also lower?

23 MS. BAUGHMAN: Objection.

24 Form.

25 THE WITNESS: It's a

1 possibility. I -- I should say that
2 after -- after the submittal of our
3 rebuttal report, we did look at
4 different values of biodegradation
5 higher and lower from what was
6 originally used. It made very little
7 difference.

8 Q. BY MS. SILVERSTEIN: In looking
9 at the different rates of biodegradation,
10 meaning higher or lower, that -- you didn't
11 do that before forming your opinions in your
12 rebuttal report; right?

13 A. No. Again, that was out of our
14 scope, but we did look at that.

15 Q. Did you look at that at the
16 request of an attorney?

17 A. Yes.

18 Q. And whatever your findings were
19 from looking at the different biodegradation
20 rates did not play a role -- or did not
21 factor into your opinions?

22 A. No.

23 Q. Okay. So the next sentence on
24 Page F29, it says -- did you -- have you
25 maintained the data that -- of your results

1 from --

2 A. Yes.

3 Q. -- the biodegradation runs?

4 A. Yes.

5 Q. Okay. We will be requesting
6 that data.

7 A. Okay.

8 Q. What -- how did you decide how
9 to change the biodegradation rate?

10 A. We were given the values to
11 use.

12 Q. Okay. And by "values," do you
13 mean the different biodegradation rates?

14 A. Yes.

15 Q. Do you know how those different
16 biodegradation rates were determined?

17 A. It's my understanding they came
18 from different -- yeah, I would say I'm not
19 sure where they came from.

20 Q. Okay. So the next paragraph on
21 Page F29, the first complete paragraph at the
22 top says "Half-lives of PCE reported in the
23 literature range from about 360 to 720 days,
24 (Lucius and others 1990). Applying these
25 half-lives to Equation 3 yields first-order

1 degradation rates ranging between .001 and
2 0.002 per day, about twice to four times the
3 rate computed using concentrations at" a
4 water -- "at water-supply Well TT-26."

5 Did I read that correctly?

6 A. Yes.

7 Q. Do you know why ATSDR used the
8 biodegradation rate calculated from two data
9 points instead of from the literature?

10 MS. BAUGHMAN: Objection. Form
11 and foundation and outside the scope.

12 THE WITNESS: No.

13 MS. SILVERSTEIN: Do you know
14 how long we've been going?

15 MR. ANWAR: Almost an hour.

16 MS. SILVERSTEIN: I think this
17 would be a good place to take a break.

18 THE WITNESS: Okay.

19 THE VIDEOGRAPHER: We're off
20 the record. The time is 3:21.

21 (There was a break taken.)

22 THE VIDEOGRAPHER: We're back
23 on the record. The time is 3:40.

24 This is Media Number 5.

25 Counsel may proceed.

1 Q. BY MS. SILVERSTEIN: Mr. Davis,
2 during the break did you talk to anybody
3 about the substance of your testimony today?

4 A. Yes. There was a little bit of
5 confusion on my part on the retardation
6 factor in bulk density and distribution
7 coefficients, but the document says that a
8 retardation factor of 2.9 was used and that's
9 what I -- my understanding was the
10 retardation factor that was used in our
11 modeling.

12 Q. Is there anything in your prior
13 testimony that you need to correct?

14 A. No.

15 Q. Would you agree that a key step
16 in developing a groundwater model is
17 calibrating the model?

18 A. Yes.

19 Q. And is it right that
20 calibration means -- well, that in
21 calibration the modeler has to adjust model
22 parameters so that the model outputs match
23 the field data?

24 A. Correct.

25 Q. And you'd agree that ATSDR

1 considered a water concentration value to be
2 matched if the simulated concentration value
3 was within plus or minus half an order of
4 magnitude of the observed concentration;
5 right?

6 MS. BAUGHMAN: Objection. Form
7 and foundation.

8 THE WITNESS: That was their --
9 that was what they were attempting to
10 do.

11 Q. BY MS. SILVERSTEIN: And you
12 would agree that a calibration target is used
13 because it's impractical for a groundwater
14 simulation to exactly match the field
15 observations?

16 MS. BAUGHMAN: Objection.
17 Form.

18 THE WITNESS: Yeah, generally,
19 especially with trans- -- fate and
20 transport models, it's very difficult
21 to get exact match everywhere.

22 Q. BY MS. SILVERSTEIN: When you
23 use a calibration target -- a modeler would
24 use a calibration target to evaluate how good
25 of a match the simulated values are?

1 MS. BAUGHMAN: Objection.

2 Form.

3 THE WITNESS: The target just
4 gives some guidances to how close I'm
5 getting to match.

6 Q. BY MS. SILVERSTEIN: You said
7 that particularly in a fate and transport
8 model, it -- it can be difficult to get the
9 values to match. Is that -- did I -- am I
10 understanding that correctly?

11 A. Yes.

12 Q. Why is it difficult to get the
13 values to match in a fate and transport
14 model?

15 A. I'm speaking as a -- a whole to
16 try to match all of the observation points.

17 Q. Okay.

18 A. As we discussed earlier, looked
19 at those plumes and some are closer than
20 others.

21 Q. Okay. And why is it difficult
22 to get all of those simulated points to match
23 the observed data points?

24 A. As we've written in both of our
25 reports, you have a lot of complexities that

1 add to that; the heterogeneities in the
2 system, the sampling, all the room for errors
3 in the sampling and reporting. And the
4 heterogeneities in the system make it -- make
5 it challenging.

6 Q. Okay. Is complex subsurface
7 conditions one of the reasons it can be
8 challenging to have the simulated data match
9 the observed data?

10 A. Correct.

11 Q. Does complex subsurface
12 conditions, is that referring to things like
13 soil heterogeneity, variations in
14 permeability, porosity, and hydraulic
15 conductivity?

16 A. Correct.

17 Q. Would it be fair to say that
18 these complex subsurface conditions can't be
19 fully captured in a groundwater model?

20 MS. BAUGHMAN: Objection.

21 Form.

22 THE WITNESS: Yes. To fully
23 capture everywhere is very difficult.

24 Q. BY MS. SILVERSTEIN: Okay. Is
25 it -- would it be fair to say that you

1 believe that calibration targets are
2 subjective -- are a subjective goal in the
3 calibration exercise?

4 MS. BAUGHMAN: You can look at
5 what you wrote in your report if you
6 want.

7 THE WITNESS: No, I just -- I
8 just wanted to make sure that you --

9 MS. BAUGHMAN: Object to the
10 form.

11 THE WITNESS: -- that you had a
12 chance.

13 Okay. Can you repeat the
14 question.

15 Q. BY MS. SILVERSTEIN: Sure.

16 Is it your opinion that
17 calibration targets are -- represent a
18 subjective goal for the calibration process?

19 MS. BAUGHMAN: Objection.
20 Form.

21 THE WITNESS: Yes.

22 Q. BY MS. SILVERSTEIN: And is it
23 your opinion that whether or not the
24 calibration target is met is a secondary
25 concern?

1 MS. BAUGHMAN: Objection to
2 form.

3 THE WITNESS: A section -- a
4 secondary -- I'm not sure I
5 understand.

6 Q. BY MS. SILVERSTEIN: Sure. If
7 you could turn to Page 3-7 of your rebuttal
8 report.

9 The -- there's a paragraph on
10 Page 3-7 that starts on the prior page.
11 That's where I'm looking.

12 The last sentence of that
13 paragraph says -- which is on Page 3-7, says
14 "Whether or not the calibration target was
15 met is generally a secondary concern"; is
16 that right?

17 A. Oh, okay. Right here.

18 Yes, I -- I would agree with
19 that statement.

20 Q. Okay. And what did you
21 highlight on Page 3-6?

22 A. Oh, just the -- where you're
23 starting the "Therefore, our calibration
24 target is ultimately a subjective 'goal'" --
25 where you started reading.

1 Q. And you would agree that plus
2 or minus half an -- or .5 half an order of
3 magnitude is the calibration target that
4 ATSDR used?

5 A. That's my understanding.

6 Q. You -- is it your belief that
7 the calibration target of plus or minus half
8 an order of magnitude used by ATSDR was
9 arbitrary?

10 MS. BAUGHMAN: Object to the
11 form.

12 THE WITNESS: It's my
13 understanding that they had a basis
14 described in -- in one of these
15 reports of why they picked that.

16 Q. BY MS. SILVERSTEIN: Okay. If
17 you could go ahead and look at the bottom of
18 Page 3-8.

19 You said "In this case, even
20 though the model was calibrated and later
21 used as a predictive tool (Davis 2007) no
22 calibration target was ever established or
23 used to gauge the accuracy of the model,
24 consistent with our point above that
25 calibration targets are generally arbitrary";

1 is that right?

2 A. That's correct. Yeah, I'm --
3 I -- I stand by that statement.

4 Q. Okay. And do you believe that
5 ATSDR's calibration target was arbitrary?

6 A. Yes. I mean, I'm -- the
7 targets are generally arbitrary, as we stated
8 in our report.

9 Q. You would agree that many of
10 the post-audit extended model simulated
11 versus observed PCE values fall outside the
12 plus or minus half an order of magnitude
13 calibration target?

14 MS. BAUGHMAN: Objection. Form
15 and foundation.

16 THE WITNESS: That is correct,
17 but I would add that where it mattered
18 the most at TT-26, it was a very good
19 fit.

20 Q. BY MS. SILVERSTEIN: And you
21 thought that ATSDR's calibration target was
22 too narrow to evaluate the post-audit; is
23 that right?

24 A. Too narrow? I don't believe we
25 said it was too narrow.

1 Q. Okay. You mentioned a minute
2 ago that where it mattered for Well TT-26,
3 the calibration target was a good match; is
4 that right?

5 A. That is correct.

6 Q. Where in your report or
7 rebuttal report do you state that?

8 A. I would have to look.

9 And we plotted -- you know, we
10 created Figure 8, you know, that -- that used
11 TT-26, and then we say, you know, here the
12 results are presented in Appendix A
13 and -- and then we talked about the
14 differences in what we updated with the
15 model. And I don't know if we -- if we said
16 specifically about TT-26 --

17 Q. Okay.

18 A. -- and that fit.

19 Q. Did you have contaminant
20 concentrations at TT-26 for 1995 to 2008 to
21 use in your post-audit?

22 A. No.

23 Q. I want to go to Chapter A,
24 Page A26.

25 A. 26?

1 Q. Yes.

2 And looking at on the left-hand
3 side at that block of text, it says "For the
4 nondetect sample data, the upper calibration
5 target was selected as the detection limit
6 for the sample (Tables A9 and A10)."

7 MS. BAUGHMAN: I'm sorry, I've
8 gotten lost. Where -- where are we
9 again?

10 MS. SILVERSTEIN: We are on
11 Page A26.

12 MS. BAUGHMAN: Of?

13 MS. SILVERSTEIN: Of Chapter A.

14 THE WITNESS: For the nondetect
15 sample data? Okay.

16 MS. BAUGHMAN: Sometimes hard
17 to jump around between all these
18 different exhibits. Okay. All right.

19 Q. BY MS. SILVERSTEIN: On
20 Page A26 on the left-hand side, that block of
21 text, it says "For the nondetect sample data,
22 the upper calibration target was selected as
23 the detection limit for the sample (Tables A9
24 and A10), and the lower calibration target
25 was selected as 1 microgram per liter."

1 A. Okay.

2 Q. Does that mean that nondetects
3 were sent -- set at 1 microgram per liter for
4 the calibration target?

5 A. For -- for the effort they did,
6 I'm not -- I don't know.

7 Q. Okay. You don't know what
8 ATSDR set the nondetects as?

9 A. No.

10 Q. If you could turn back to
11 Page A25. On the left-hand column, the last
12 paragraph says "Water-supply well data
13 included 17 of 36 samples reported as
14 nondetect (Table A9) and these samples were
15 not used in the computation of the geometric
16 bias."

17 Did I read that correctly?

18 A. Yes.

19 Q. And then if you look in the
20 right-hand column, the second paragraph from
21 the bottom, it says "For the Tarawa Terrace
22 water treatment plant, 15 of 25 samples were
23 recorded as nondetect (Table A10). The
24 nondetect samples were not used in the
25 computation of the geometric bias."

1 Did I read that correctly?

2 A. Yes.

3 Q. Does that mean that ATSDR
4 didn't use nondetect samples to calculate the
5 geometric bias?

6 MS. BAUGHMAN: Objection. Form
7 and foundation. Outside the scope.

8 THE WITNESS: I -- I would
9 assume that they didn't since that's
10 what it says.

11 Q. BY MS. SILVERSTEIN: And does
12 that mean that ATSDR did not consider
13 nondetect samples in its assessment of the
14 calibration of the Tarawa Terrace fate and
15 transport and mixing models for PCE?

16 MS. BAUGHMAN: Objection.
17 Form. Foundation.

18 THE WITNESS: I don't know.

19 Q. BY MS. SILVERSTEIN: You would
20 agree that ATSDR used only 17 of 36 well
21 samples in its geometric bias calculation
22 used to assess calibration; is that right?

23 A. That is correct.

24 Q. And you'd agree that ATSDR used
25 only 15 of 25 samples in its geometric bias

1 calculation to assess the calibration of the
2 mixing model; is that right?

3 A. Correct.

4 Q. Okay. I want to turn to
5 Chapter F on Page F33.

6 A. 33?

7 Q. Yes.

8 Okay. That first paragraph
9 that is continuing on Page F33, I want to
10 look at the last sentence. It says "Both
11 results indicate that simulated PCE
12 concentrations moderately to substantially
13 overpredicted observed concentrations at
14 water supply wells"; is that correct?

15 A. That's what it says. But I --
16 again, I would point out that where the
17 concentrations were high, like if you look at
18 Figure F12 where the concentrations were
19 high, the model did a very good job at
20 matching.

21 Q. Even though ATSDR stated that
22 the results indicate the simulated PCE
23 concentrations moderately to substantially
24 overpredict observed concentrations; is that
25 right?

1 A. Correct.

2 Q. And you would agree that your
3 extended simulation model confirms that
4 ATSDR's model overpredicted observed
5 concentrations at water supply wells?

6 MS. BAUGHMAN: Objection to
7 form.

8 THE WITNESS: I -- I would say
9 our extended model showed that it --
10 that it was a better -- better fit.
11 Still a little bit overpredicting, but
12 better.

13 Q. BY MS. SILVERSTEIN: I'm sorry,
14 what was a better fit?

15 A. The extended model and the
16 observation data that was -- that was
17 incorporated.

18 Q. Okay. So you would say that
19 the extended model was a better fit than the
20 original model?

21 A. Correct.

22 Q. And is it your opinion that
23 ATSDR's model does not do a good job at
24 predicting concentrations when the observed
25 concentrations are low?

1 MS. BAUGHMAN: Objection.

2 Form.

3 THE WITNESS: That's -- that's
4 what this Figure F12 would -- would
5 suggest.

6 Q. BY MS. SILVERSTEIN: Okay.
7 Okay. On -- on Page F33, I want to take a
8 moment -- minute to look at Table F13.
9 Table F13 shows the simulated and observed
10 tetrachloroethylene or PCE concentrations at
11 water supply wells and calibration target
12 range at Tarawa Terrace and vicinity,
13 U.S. Marine Corps Base Camp Lejeune,
14 North Carolina; is that right?

15 A. Correct.

16 Q. And you would agree that for
17 Well TT-23, ATSDR had 11 samples for
18 calibration; is that right?

19 A. Correct.

20 Q. And in all 11 of those samples,
21 ATSDR's model overpredicted the PCE
22 concentrations; right?

23 A. Correct.

24 Q. And you would agree that 10 of
25 those 11 data points failed to meet ATSDR's

1 calibration target of plus or minus half an
2 order of magnitude?

3 A. Correct.

4 Q. For Well TT-26, ATSDR had eight
5 samples?

6 A. Correct.

7 Q. And you'd agree that five of
8 the eight samples overpredicted PCE
9 concentrations; right?

10 A. Yes. But I would also point
11 out that three of those samples were within
12 either the same day or close to the same
13 time.

14 Q. Okay. So that, yes, that --

15 A. Yes.

16 Q. -- five of the eight samples at
17 TT-26 overpredicted PCE concentrations?

18 MS. BAUGHMAN: Objection.

19 Form. Asked and answered.

20 THE WITNESS: Yes.

21 Q. BY MS. SILVERSTEIN: And you'd
22 agree that for Well TT-25, there -- ATSDR
23 again had eight samples for model
24 calibration?

25 A. Yes.

1 Q. And of those eight samples, you
2 would -- at Well TT-25, you would agree that
3 six of them overpredicted the PCE
4 concentrations; right?

5 A. Yes.

6 Q. Okay. I want to go back to
7 Chapter A. I know we're talking about things
8 that are discussed in multiple chapters. If
9 you could go to Page A93.

10 Are you on Page A93?

11 A. Yes.

12 Q. Okay. A93 has Appendix A2,
13 which is the simulated tetrachloroethylene
14 and its degradation byproducts and finished
15 water at Tarawa Terrace water treatment plant
16 January 1951 to March 1987, continued; is
17 that right?

18 A. Correct.

19 Q. You would agree that after
20 Well TT-26 shut down, there were no PCE
21 detections?

22 A. Are you asking me to -- from a
23 different or from this table?

24 Q. So based on your review of the
25 records, are you aware of any PCE detections

1 in Well TT-26 after Well TT-26 shut down?

2 MS. BAUGHMAN: Objection.

3 Form.

4 I don't think you meant to say
5 that. You might want to rephrase it.
6 It didn't make sense.

7 THE WITNESS: Can you ask the
8 question again?

9 Q. BY MS. SILVERSTEIN: Sure.

10 Are you aware of any PCE
11 detections in Well TT-26 after it went out of
12 service?

13 MS. BAUGHMAN: Objection.

14 Form.

15 THE WITNESS: I'm not aware.

16 Q. BY MS. SILVERSTEIN: Is your
17 understanding that ATSDR modeled PCE
18 concentrations using MT3DMS above the 10 PPB
19 detection limit? Is that -- is that fair?

20 A. I'm not sure what you're
21 asking.

22 Q. Okay. Did ATSDR model PCE
23 concentrations using MT3DMS for TT-26 after
24 it shut down above the detection limit?

25 MS. BAUGHMAN: Objection.

1 Form.

2 THE WITNESS: I mean, they
3 continued the model until 1994, the
4 end of 1994, so the contaminants were
5 continuing to move in the aquifers
6 through the -- through that time.

7 MS. SILVERSTEIN: Okay.

8 THE WITNESS: Even though TT-26
9 was not pumping.

10 Q. BY MS. SILVERSTEIN: Okay. Are
11 you aware of any sample results showing above
12 the detection limit for Well TT-26 after it
13 shut down?

14 A. I'm not aware.

15 MS. BAUGHMAN: Objection.

16 Form.

17 Q. BY MS. SILVERSTEIN: Would it
18 be -- would you agree that model validation
19 is part of the model development process?

20 MS. BAUGHMAN: Objection.

21 Form.

22 THE WITNESS: What do you mean
23 by "model validation"?

24 Q. BY MS. SILVERSTEIN: Sure.

25 When you're creating a -- a

1 groundwater model, do you do anything to
2 validate the results of your model?

3 MS. BAUGHMAN: Objection.
4 Form.

5 THE WITNESS: Sometimes.

6 Q. BY MS. SILVERSTEIN: Okay.
7 Would it be fair to say that when determining
8 how accurate a model is, you can look to
9 either invalidate or validate a model?

10 MS. BAUGHMAN: Objection.
11 Form.

12 THE WITNESS: No, I don't.

13 Q. BY MS. SILVERSTEIN: Okay. So
14 is it your opinion that there's no
15 significant evidence that invalidates the
16 analyses performed by ATSDR in the original
17 model?

18 A. Okay. Sorry. Can you repeat
19 that one more time?

20 MS. BAUGHMAN: You're reading
21 from his report; right?

22 MS. SILVERSTEIN: I'm asking
23 him a question.

24 Q. Are you aware --

25 MS. BAUGHMAN: About an opinion

1 of his report.

2 MS. SILVERSTEIN: Sure. And
3 he's welcome to reference his
4 opinions.

5 Q. But are you aware of anything
6 that invalidates -- of any evidence that
7 invalidates ATSDR's analysis of the original
8 model?

9 A. No.

10 Q. Okay. Would it be fair to say
11 that evidence that invalidates a model is
12 different than evidence that validates the
13 accuracy of a model?

14 A. I guess --

15 MS. BAUGHMAN: Objection.
16 Form.

17 THE WITNESS: I guess I've
18 never heard of coming up with evidence
19 that invalidates a model.

20 Q. BY MS. SILVERSTEIN: Okay.
21 You've never heard of evidence that
22 invalidates a model. How, then, would you be
23 able to determine whether the model results
24 are accurate?

25 A. Through the calibration

1 exercise, or are you talking about something
2 different?

3 Q. Is calibration the only way
4 that you would determine whether a model
5 accurately represents --

6 A. No, no. We -- I think you can
7 consider the effort that we did in the
8 post-audit strengthens the validity of the
9 Tarawa Terrace model.

10 Q. You just said "the validity."
11 What do you mean by "the validity"?

12 A. Or the -- what we did didn't
13 contradict the results and conclusions that
14 they had made about the migration of the
15 plume.

16 Q. Okay. When you say "didn't
17 contradict," what would indicate to you that
18 a model did contradict? Did contradict the
19 assumptions?

20 MS. BAUGHMAN: Objection.
21 Form.

22 THE WITNESS: If, when we
23 extended the model, that -- that the
24 plume behaved differently than -- than
25 what was being observed.

1 Q. BY MS. SILVERSTEIN: Okay.
2 Can -- is the only way to do that through a
3 post-audit?

4 MS. BAUGHMAN: Objection.
5 Form.

6 THE WITNESS: No.

7 Q. BY MS. SILVERSTEIN: Okay. If
8 you wanted to know how well a model performed
9 without a post-audit, what kind of analysis
10 could you do?

11 A. You could -- you could do a
12 validation of the existing model. That would
13 be one way.

14 Q. What is a validation of the
15 existing model?

16 A. That would -- that would have
17 data that they didn't use in their original
18 calibration that they would then plug into
19 the original model to -- to validate the same
20 response.

21 Q. To your knowledge, was that
22 process done on the ATSDR model?

23 MS. BAUGHMAN: Objection. Form
24 and foundation.

25 THE WITNESS: Not to my -- I --

1 I don't know.

2 Q. BY MS. SILVERSTEIN: Would you
3 agree that ATSDR used all of its real-world
4 sampling data to calibrate its original
5 model?

6 MS. BAUGHMAN: Objection.
7 Form. Foundation.

8 THE WITNESS: That's my
9 understanding.

10 MS. SILVERSTEIN: I'm handing
11 you Exhibit 12.

12 (Exhibit 12 was marked for identification.)

13 Q. BY MS. SILVERSTEIN: I handed
14 you Exhibit 12, which is titled "Ground-Water
15 Models: Validate or Invalidate."

16 Do you see that title?

17 A. Yes.

18 Q. And it says by it "J.D.
19 Bredehoeft" and "L.F. Konikow."

20 Do you see that?

21 A. Yep.

22 Q. Are you familiar with J.D.
23 Bredehoeft?

24 A. Bredehoeft, yes, I am.

25 Q. How are you familiar with him?

1 A. He's a respected groundwater
2 person who I think has passed away.

3 Q. I want to direct your attention
4 to -- to Page 494, which is the second -- the
5 second page in this document.

6 Do you see the heading
7 "Postaudits"?

8 A. Yes.

9 Q. It says "Several postaudits
10 have been performed to evaluate the accuracy
11 of predictions made using supposedly
12 'validated' models. Compared to the number
13 of model studies, the number of postaudits is
14 small. There are numerous problems in
15 examining past predictions; often the stress
16 placed on the system was quite different from
17 what was used in the model analysis."

18 Did I read that correctly?

19 A. Yes.

20 Q. And then it continues. "The
21 results of the current set of postaudits
22 suggest that extrapolations into the future
23 were rarely very accurate. There are various
24 problems with models: the period of history
25 match was too short to capture an important

1 element of the model, or the conceptual model
 2 was incomplete, or the parameters were not
 3 well-defined, et cetera. Our experience
 4 suggests that the models are more useful as
 5 tools used by the hydrologist to understand
 6 the system rather than as tools to predict
 7 future response. Our record of 'validating'
 8 models is not encouraging."

9 Did I read that correctly?

10 A. Correct.

11 Q. You can set that aside.

12 I guess, first, do you agree
 13 with that statement by Bredehoeft and
 14 Konikow?

15 MS. BAUGHMAN: Objection. Form
 16 and foundation.

17 I'm not sure which statement
 18 and I'm not sure if he's ever read the
 19 article.

20 If you're going to answer that,
 21 I think you need to read the article
 22 first.

23 THE WITNESS: Yeah, I would
 24 just say that I have not read this
 25 article, but they are talking about

1 extrapolations into the future, and
2 what we're looking at is something
3 different. We're looking in the past.
4 We're not making predictions into the
5 future.

6 Q. BY MS. SILVERSTEIN: You would
7 agree that ATSDR didn't check their model
8 against samples for any time before 1980; is
9 that right?

10 A. Didn't what?

11 Q. They didn't compare the results
12 of their model against any samples from
13 before 1980; is that right?

14 MS. BAUGHMAN: Objection. Form
15 and foundation.

16 And are you talking about flow
17 samples? Are you talking about
18 concentration samples? It's vague as
19 to what that question is about.

20 THE WITNESS: What specific
21 types of samples are you referring to?

22 Q. BY MS. SILVERSTEIN: Are you
23 aware of any samples that you did before 1980
24 that ATSDR compared its model against?

25 A. Concentration samples?

1 Q. Sure, concentration samples.

2 A. I'm not aware.

3 Q. Are there any other types of
4 samples that you're aware of that ATSDR
5 looked at from before 1980?

6 MS. BAUGHMAN: Any types of
7 data you mean?

8 MS. SILVERSTEIN: Other types
9 of samples.

10 THE WITNESS: Other than
11 concentration samples?

12 MS. SILVERSTEIN: Right.

13 THE WITNESS: Like what
14 samples -- kind of other samples are
15 you thinking about?

16 Q. BY MS. SILVERSTEIN: A minute
17 ago counsel objected to me saying "samples,"
18 saying that that was vague and it could be
19 many different types of samples.

20 Are you aware of any other
21 kinds of samples in addition -- besides
22 concentration samples that ATSDR looked at
23 before 1980?

24 MS. BAUGHMAN: For the flow
25 model or the transport model?

1 THE WITNESS: There's a
2 possibility that there were -- that
3 they used water level information that
4 was -- that existed.

5 Q. BY MS. SILVERSTEIN: Are you --

6 A. To the extent of what that was,
7 I don't know.

8 Q. You're not aware of anything
9 that they looked at?

10 MS. BAUGHMAN: Objection.
11 Form. Foundation.

12 THE WITNESS: I -- no, not --
13 not conclusively.

14 Q. BY MS. SILVERSTEIN: So I
15 think, as you've indicated, one way a modeler
16 can evaluate the accuracy of their model is
17 to do a post-audit; is that fair?

18 A. Correct.

19 Q. Okay. And would it be fair to
20 say that post-audits are generally done to
21 see if models' predictions match what
22 happened?

23 MS. BAUGHMAN: Objection.
24 Form. Foundation.

25 THE WITNESS: That -- that's

1 one -- that's one application.

2 Q. BY MS. SILVERSTEIN: And based
3 on a post-audit, the model would then be
4 revised to improve future prediction?

5 MS. BAUGHMAN: Objection.

6 Form. Foundation.

7 THE WITNESS: Not necessarily.

8 Q. BY MS. SILVERSTEIN: Okay. So
9 you could do a post-audit and not then revise
10 a model to prove future predictions?

11 A. An example is the -- is our
12 efforts.

13 Q. Sure. Would you say -- so I'm
14 talking about in this circumstance where a
15 post-audit is done to see if the model
16 accurately predicts what happens in the
17 future. That's one way that a post-audit
18 would be used; right?

19 A. That is one application.

20 Q. Okay. And in that kind of
21 situation, would the model then be revised
22 after the post-audit to improve future
23 predictions?

24 MS. BAUGHMAN: Objection. Form
25 and foundation.

1 THE WITNESS: It's possible.

2 Q. BY MS. SILVERSTEIN: I want to
3 go ahead and look at your report.

4 A. Which one? The rebuttal or the
5 original?

6 Q. Yep. Just a second. Your
7 rebuttal report.

8 A. Okay.

9 Q. I will come back to that in a
10 minute.

11 In one of your opinion -- do
12 you hold the opinion that ATSDR's methodology
13 was scientifically sound?

14 A. Yes.

15 Q. And do you hold the opinion
16 that ATSDR's methodology is accepted within
17 the scientific community?

18 A. Yes.

19 Q. Did you evaluate the
20 methodology used by ATSDR?

21 MS. BAUGHMAN: Objection.
22 Form.

23 THE WITNESS: Evaluated to the
24 extent that we read the process that
25 they went through.

1 Q. BY MS. SILVERSTEIN: And when
2 you say "read the process that they went
3 through," did you make determinations about
4 whether their assumptions for various
5 parameters were reliable?

6 MS. BAUGHMAN: Objection.
7 Form.

8 THE WITNESS: We assumed that
9 the numbers that they reported in the
10 document were reliable.

11 Q. BY MS. SILVERSTEIN: So just --
12 just to be clear, you assumed the numbers
13 they reported were reliable. Does that mean
14 that you didn't -- you don't have an opinion
15 about whether or not they used reliable
16 processes to determine those number -- those
17 parameters?

18 MS. BAUGHMAN: Objection.
19 Form.

20 THE WITNESS: Yeah, that was
21 out of our scope.

22 Q. BY MS. SILVERSTEIN: Okay. So
23 you don't have opinions about whether they
24 used reliable processes to determine those
25 parameters?

1 MS. BAUGHMAN: Objection.

2 Form.

3 THE WITNESS: That's correct.

4 Q. BY MS. SILVERSTEIN: In -- my
5 understanding is that you only reviewed the
6 Tarawa Terrace reports Chapters A, C, and F;
7 is that right?

8 A. I believe that is correct.

9 Q. So would it be fair to say that
10 your opinion that ATSDR's model was developed
11 using a scientifically sound methodology is
12 limited to the methodology discussed in
13 Chapters A, C, and F of the Tarawa Terrace
14 models?

15 MS. BAUGHMAN: Objection.

16 Form.

17 THE WITNESS: Yes, I think you
18 can say that.

19 Q. BY MS. SILVERSTEIN: You said
20 that you evaluated their methodology by
21 reading the reports, meaning Chapters A, C,
22 and F; is that right?

23 A. Correct.

24 Q. Is there anything else that you
25 did to evaluate the methodology used by

1 ATSDR?

2 A. Not -- not besides running the
3 model and looking at the results and
4 comparing to what they did and what we did,
5 yeah.

6 Q. Did ATSDR have well pumpage
7 data for the period 1953 to 1987?

8 MS. BAUGHMAN: Objection.

9 Form.

10 THE WITNESS: I believe that
11 was limited.

12 Q. BY MS. SILVERSTEIN: What do
13 you mean "limited"?

14 A. Well, I'd have to read -- I'd
15 have to go back and -- into the document to
16 see exactly that -- that they said. We did
17 not have well pumping data between 1953 and
18 '84.

19 Q. Okay. If you want to take a
20 look at Chapter A, Page A17.

21 A. A17?

22 Q. Yes.

23 A. Okay.

24 Q. The last paragraph on that
25 page says "Based on epidemiological

1 considerations, historical reconstruction
2 results were provided at monthly intervals.
3 Ideally, these analyses require monthly
4 groundwater pumpage data for the historical
5 period. However, pumpage data were limited
6 and were available on a monthly basis solely
7 for 1978 and intermittently during the period
8 of 1981 to 1985"; is that right?

9 A. That's correct.

10 Q. So aside from during 1978 and
11 19- -- intermittently from 1981 to 1985,
12 ATSDR did not have any well pumpage data for
13 the period 1953 to 1987?

14 A. According to that -- this
15 document, that is true.

16 Q. You said -- earlier we talked
17 about your opinion that the errors in the
18 post-audit are well balanced; is that right?

19 A. Better than the original model.

20 Q. Okay.

21 A. Still a little balanced high.

22 Q. And is it correct that you
23 performed the -- ran the simulation on the
24 post-audit twice?

25 A. Twice?

1 Q. You have two sets of results
2 for the post-audit; is that right?

3 I can ask it differently.

4 A. Yeah.

5 Q. You did the post-audit and have
6 the simulated concentration values in the
7 post-audit in your initial report; right?

8 A. Correct.

9 Q. You had to rerun the post-audit
10 for your rebuttal report; is that right?

11 A. That's correct.

12 Q. And that's because you had to
13 correct some input errors that were
14 highlighted by Dr. Spiliotopoulos; is that
15 right?

16 A. Correct.

17 Q. As part of the post-audit, you
18 calculated the mean error and mean absolute
19 error; is that right?

20 A. Correct.

21 Q. And is my understanding that
22 the mean error is the average difference of
23 the residual errors; is that right?

24 A. That's correct.

25 Q. Okay. And is -- my

1 understanding is the residual error is the
2 difference between the observed and simulated
3 values; is that right?

4 A. Computed versus observed, yeah.

5 Q. When I say "simulated," does
6 "simulated" mean something different than
7 computed?

8 A. No. Same.

9 Q. Okay. So if I say "simulated,"
10 you can just infer that I also mean --

11 A. Yes.

12 Q. -- computed and respond with
13 whichever word you prefer?

14 A. Yes.

15 Q. And is the mean absolute error
16 the average of the absolute value of the
17 residual error?

18 A. Correct. Well, it's the
19 mean -- it's the mean absolute. So each --
20 each error is the absolute error, and then
21 those are averaged.

22 Q. Which means that the mean error
23 could be negative, but the mean absolute
24 error --

25 A. Would always be positive.

1 Q. And would a negative mean error
2 indicate that a model underpredicts observed
3 values?

4 A. On average.

5 Q. On average?

6 A. Correct.

7 Q. And a -- would a positive mean
8 error indicate that, on average, a model
9 overpredicts observed values?

10 A. Correct.

11 Q. And you calculated the mean
12 error in both your initial report and your
13 rebuttal report; is that right?

14 A. Correct.

15 Q. Okay. In your initial report,
16 the mean error was 21 micrograms per liter?

17 A. What page are you looking on?

18 Q. On Page 5-2 under the section
19 labeled "Monitoring Wells."

20 A. Yes.

21 Q. You said "Taking all values
22 into consideration, the mean error" is --
23 "equals 21 micrograms per liter"; is that
24 right?

25 A. Correct.

1 Q. And you corrected your -- you
2 had a new mean error in the -- in your
3 rebuttal report; is that right?

4 A. Correct.

5 Q. And that was based on
6 correcting your -- the calculations in your
7 model?

8 A. Correct.

9 Q. You would agree that the mean
10 error after you corrected the input values
11 increased?

12 A. Slightly. Went from 21 to 22.

13 Q. If you could go to Page 3-11 of
14 your rebuttal report. And looking at the
15 last couple of sentences there, it says
16 "Correcting the termination of the mass
17 loading by changing it from the end of
18 December 1983 to the end of December 1984 had
19 a larger impact and increased the PCE
20 concentration to some degree at most of the
21 well locations. The average increase was
22 27 micrograms per liter"; is that right?

23 A. Yeah, that's correct. I -- I
24 stand corrected. It went from 21 to 48,
25 so...

1 Q. And you would agree that this
2 indicates a small high bias in the model
3 results; right?

4 A. Yes. Yeah.

5 Q. You'd also agree that there
6 were several instances in the extended model
7 where the observed value was zero and the
8 simulated or computed value was nonzero,
9 higher than zero?

10 A. That's correct.

11 Q. There are also instances where
12 the simulated value was zero but the observed
13 value was nonzero; is that right?

14 A. I believe so, yes.

15 Q. You said a few minutes ago,
16 maybe more than a few minutes ago, that you
17 made corrections to the extended model based
18 on errors that were identified by
19 Dr. Spiliotopoulos; right?

20 A. Correct.

21 Q. One of those errors was a
22 truncation error; is that right?

23 A. Yes.

24 Q. Meaning you had truncated the
25 PCE values down to a lower number of

1 significant digits; right?

2 A. Correct. When -- yeah, when I
3 exported the -- the values, they were
4 truncated. So when we -- when we -- when I
5 ran it the second time with the other fixes,
6 I gave -- I gave Dr. Jones the numbers in --
7 all significant numbers that were available
8 from the -- from the computed results.

9 Q. Okay. And this resulted in
10 some of the simulated PC values being higher
11 than the observed values and others being
12 lower than the observed values; is that
13 right?

14 A. I can't remember if there were
15 some that were lower, but there would --
16 there is a chance that there were some that
17 were higher where before in our original one,
18 they would have just been zero.

19 Q. Okay.

20 A. But the number of higher or
21 lower, I don't -- I don't recall how many of
22 each.

23 Q. You also directed an error
24 using the incorrect source termination date;
25 is that right?

1 A. Correct. Yeah, we fixed it
2 from ending in 1983 to ending in 1984.

3 Q. And you corrected an error in
4 using the incorrect pumping rate for Well
5 RWC-2 from March 7, 2004, to December 16,
6 2004?

7 A. Correct, for those nine months.

8 Q. I want to go ahead and go back
9 to your initial report, to the executive
10 summary.

11 You determined that the ATSDR's
12 model was sufficient for -- or effectively
13 simulated long-term trends; is that right?

14 A. Correct.

15 Q. What do you mean by "long
16 term"?

17 A. For the duration of the
18 model -- the duration, the period that they
19 modeled is long term.

20 Q. Do you -- is it your opinion --
21 well, do you have an opinion on whether or
22 not the model could effectively simulate
23 month-to-month trends?

24 MS. BAUGHMAN: Objection.

25 Form.

1 THE WITNESS: Yes, I think it
2 effectively modeled the month-by-month
3 term -- terms.

4 Q. BY MS. SILVERSTEIN: Do you
5 have an opinion as to whether the model
6 effectively simulates contaminant
7 concentrations at the wells?

8 A. Yes.

9 Q. And is it your opinion that the
10 concentrations simulated by the model are
11 reliable for determining what the
12 concentration was at a specific month?

13 MS. BAUGHMAN: Objection.
14 Form.

15 Do you mean at the water
16 treatment plant?

17 MS. SILVERSTEIN: Sure.

18 Q. Do you have -- is it your
19 opinion that the models -- the simulated
20 concentration data is reliable for
21 determining what the concentration was at a
22 specific month?

23 MS. BAUGHMAN: Objection.
24 Form.

25 THE WITNESS: At the wells or

1 at the treatment plant or at some
2 other location?

3 Q. BY MS. SILVERSTEIN: Anywhere.

4 A. Yes.

5 Q. And where -- first, where do
6 you state in your -- either of your reports
7 that you have an opinion that the monthly
8 concentration data is reliable?

9 A. I don't believe that we were
10 specific about a monthly time step being
11 reliable. We didn't state that.

12 Q. So, in other words, none of the
13 opinions that you offer in your initial
14 report or your rebuttal report include the
15 opinion that the ATSDR model is reliable for
16 determining what the concentration was at a
17 specific month?

18 A. Not --

19 MS. BAUGHMAN: Objection.
20 Form.

21 THE WITNESS: Not in those
22 specific words.

23 Q. BY MS. SILVERSTEIN: Okay.
24 What words in your report -- where in your
25 reports do you believe that that opinion is

1 covered?

2 A. In our conclusions and summary
3 about the reliability of the model that was
4 originally developed and its applicability to
5 what it was constructed for.

6 For example, at the end of our
7 Executive Summary on Page VI -- or VI. "In
8 summary, this post-audit found that the
9 original Tarawa Terrace groundwater model and
10 transport models were developed using sound
11 methodology and continue to provide reliable
12 insights into the migration of PCE
13 concentration [sic]."

14 MS. BAUGHMAN: Contamination.

15 THE WITNESS: Contamination.

16 Q. BY MS. SILVERSTEIN: So your
17 opinion is that the model is reliable for
18 determining the migration of the PCE
19 contamination; is that fair?

20 MS. BAUGHMAN: Objection.

21 Form.

22 THE WITNESS: Yes.

23 Q. BY MS. SILVERSTEIN: Where do
24 you say that it's your opinion that the model
25 is reliable for determining what the

1 concentration was in a specific month?

2 A. We didn't -- we did not use
3 those specific words.

4 Q. Okay. And it's your opinion --
5 it's your belief that saying it's reliable
6 for insights into the migration of PCE
7 contamination includes reliability about what
8 a specific concentration was?

9 A. Yes.

10 Q. What is that based on?

11 A. It's based on --

12 MS. BAUGHMAN: Objection.
13 Form.

14 THE WITNESS: -- the
15 observation data and the agreement of
16 the computed values to the observation
17 data and all of the evaluation, both
18 quantitative and qualitative, to make
19 that -- to make that --

20 Q. BY MS. SILVERSTEIN: Is it your
21 opinion that ATSDR's model is reliable and
22 accurate for determining what the specific
23 concentration of PCE was at the Tarawa
24 Terrace water treatment plant in 1961?

25 A. Yes.

1 Q. And why do you believe that?

2 A. Based on the original author's
3 efforts to calibrate the model and the effort
4 that we did in the post-audit and the looking
5 at the observed data and how well that fit
6 gives me that opinion that's valid for 1961.

7 Q. Earlier I showed you Exhibit 6,
8 the ATSDR's response to criticism from the
9 Navy.

10 Do you recall that?

11 A. What document was that in?
12 Exhibit 6?

13 Q. Exhibit 6, yes.

14 And if you could look at the
15 page ending in 272.

16 A. 272, okay.

17 Q. And looking at the last
18 paragraph, it says "To address the issue of
19 the intended use of the water-modeling
20 results by the current ATSDR epidemiological
21 study, the DON should be advised that a
22 successful epidemiological study places
23 little emphasis on the actual (absolute)
24 estimate of concentration and, rather,
25 emphasizes the relative level of exposure.

1 That is, exposed individuals are, in effect,
2 ranked by exposure level and" maintained --
3 "maintain their rank order of exposure level
4 regardless of how far off the estimated
5 concentration is to the 'true' (measure) PCE
6 concentration. This rank order of exposure
7 level is preserved regardless of whether the
8 mean or the upper or lower 95 percent of
9 simulated levels are used to estimate the
10 monthly average contaminant levels. It is
11 not the goal of the ATSDR health study to
12 infer which health effects occur at specific
13 PCE concentrations."

14 Did I read that correctly?

15 A. Yes.

16 Q. Is it your understanding that
17 ATSDR was looking to determine what the
18 actual concentrations were at the Tarawa
19 Terrace water treatment plant?

20 MS. BAUGHMAN: Objection.

21 Form.

22 You mean "mean monthly"
23 concentrations?

24 MS. SILVERSTEIN: The actual
25 mean monthly concentration.

1 MS. BAUGHMAN: Still object to
2 form.

3 Q. BY MS. SILVERSTEIN: Is that
4 your -- is that your understanding?

5 A. Yes.

6 Q. And is it your understanding
7 that that -- that ATSDR was attempting to
8 determine the actual mean monthly value at
9 the wells even though they stated that the
10 emphasis was on the relative level of
11 exposure?

12 MS. BAUGHMAN: Objection. Form
13 and foundation --

14 THE WITNESS: Who --

15 MS. BAUGHMAN: -- and asked and
16 answered.

17 THE WITNESS: Who stated?

18 Q. BY MS. SILVERSTEIN: In the
19 paragraph that I just read you, they stated
20 that the emphasis was on the relative level
21 of exposure; right?

22 MS. BAUGHMAN: Objection.
23 Form. Foundation.

24 THE WITNESS: And -- and that
25 is what --

1 MS. BAUGHMAN: And asked and
2 answered.

3 THE WITNESS: -- you're saying
4 the A -- ASTD -- ATSDR said that?

5 MS. SILVERSTEIN: Yes.

6 MS. BAUGHMAN: Calls for
7 speculation. Asked and answered.

8 THE WITNESS: Okay. Can you
9 ask the question one more time?

10 Q. BY MS. SILVERSTEIN: Sure.

11 ATSDR places little -- said
12 that they place little emphasis on the actual
13 absolute estimate of the concentration level;
14 is that right?

15 MS. BAUGHMAN: Objection.

16 Form. Mischaracterizes the document.

17 And this is talking about the
18 intent of the epidemiology study, not
19 the intent of the water modeling, so
20 you're mischaracterizing the document.

21 Q. BY MS. SILVERSTEIN: Do you see
22 where it says that their focus was on the --
23 was not on the actual absolute value of the
24 water concentration?

25 MS. BAUGHMAN: Objection. Form

1 and foundation.

2 THE WITNESS: According to
3 this, based on the epidemiological
4 study.

5 Q. BY MS. SILVERSTEIN: And when
6 you say "based on the epidemiological study,"
7 you understand that the epidemiological study
8 relied on the ATSDR water modeling results
9 that you reviewed in this case?

10 MS. BAUGHMAN: Objection.
11 Form. Foundation. This is outside
12 the scope.

13 He's not giving opinions on
14 what the epidemiology study did or
15 didn't do.

16 THE WITNESS: Yeah, I'm not
17 sure I understand what they're trying
18 to say here.

19 Q. BY MS. SILVERSTEIN: Are you
20 offering an opinion about whether or not the
21 ATSDR water model for Tarawa Terrace can be
22 used to determine a specific individual's
23 exposure?

24 MS. BAUGHMAN: Objection.
25 Form. Foundation. Outside the scope

1 of this report.

2 THE WITNESS: No.

3 MS. SILVERSTEIN: How long have
4 we been going for?

5 MS. BAUGHMAN: It's been over
6 an hour.

7 MS. SILVERSTEIN: Let's go
8 ahead and take a break now, then.

9 MS. BAUGHMAN: And can you let
10 us know how much is left of the seven
11 hours?

12 THE VIDEOGRAPHER: We have --
13 we're on 5:24 now.

14 MS. BAUGHMAN: Thank you.

15 THE VIDEOGRAPHER: We're off
16 the record. The time is 4:45 -- 4:46.

17 (There was a break taken.)

18 THE VIDEOGRAPHER: We're back
19 on the record. The time is 5:15.

20 Counsel may proceed.

21 Q. BY MS. SILVERSTEIN: Mr. Davis,
22 during the break did you talk to anybody
23 about the substance of your testimony today?

24 A. Yes, I talked to our -- our
25 legal team.

1 Q. And when you say "our legal
2 team," do you mean Laura and Devin?

3 A. Laura and Devin, correct.

4 Q. What did you talk about
5 regarding the substance of your testimony?

6 A. A question that I had based on
7 the question that you asked me about whether
8 or not all of the data was used for the
9 calibration of the original model.

10 Q. Okay.

11 A. And I -- I just need to correct
12 my answer, because as I was thinking about it
13 and had -- had to look at some documents in
14 Section F, that the data for the treatment
15 plant was not used in the calibration; it was
16 used after the model was calibrated to verify
17 the validity of the groundwater model, the PC
18 concentrations.

19 Q. And where in Chapter F are you
20 referring to?

21 A. It's, like, Page -- Chapter F,
22 I believe it's 40 -- Page 42 from the Level 4
23 calibration.

24 Even though the word
25 "calibration" was used here for the mixing

1 model, the original -- the parameters weren't
2 changed based on the observed values at the
3 treatment plant, but this data was used
4 separately from the data that was used to
5 calibrate the original model in the -- the
6 Level 3 effort.

7 There's also corresponding
8 descriptions of the same thing in Morris' and
9 Dr. Aral's expert reports.

10 Q. Okay. So is it your
11 understanding, then, that ATSDR used
12 concentration data after the model was
13 calibrated to validate the model?

14 A. To verify what the results they
15 were getting.

16 Q. Okay. And which -- which
17 sample data did they use to verify the
18 results?

19 A. The -- the data that's listed
20 in Table F14.

21 Q. Okay. And Table F14 is
22 Computed and observed tetrachloroethylene
23 (PCE) concentrations in water samples
24 collected at the Tarawa Terrace water
25 treatment plant and calibration target rate;

1 is that right?

2 A. Correct.

3 Q. Prior to discussing this with
4 your -- with the legal team during the break,
5 were you -- were you aware that ATSDR had
6 used that data to verify?

7 A. Yes, yeah. And then in trying
8 to answer the questions, and you asked me did
9 they use all of the data, then -- and I
10 misspoke, because they didn't use this
11 particular data in that effort.

12 Q. They used this particular data
13 to -- would it be right to say to look at
14 the -- how the simulated data fit within the
15 calibration target; is that right?

16 MS. BAUGHMAN: Objection.
17 Form.

18 THE WITNESS: They looked at
19 this data to -- as they got the mean
20 monthly concentrations and they
21 compared that with what they had
22 observed at the treatment plant.

23 Q. BY MS. SILVERSTEIN: And they
24 did that to look at the calibration target;
25 is that what they were doing?

1 MS. BAUGHMAN: Objection.

2 Form.

3 THE WITNESS: No, there's no
4 calibration targets here --

5 Q. BY MS. SILVERSTEIN: Okay. So
6 they --

7 A. -- in this case.

8 Q. -- just were doing that to
9 verify the data?

10 A. The validity of the data, yeah.

11 Q. Is this all of the data that
12 ATSDR used to look at the validity of the
13 data?

14 MS. BAUGHMAN: Objection.

15 Form. Foundation.

16 THE WITNESS: I assume, yes.
17 The data that you're talking
18 about that's listed in Table F14?

19 MS. SILVERSTEIN: Correct.

20 THE WITNESS: I assume that is
21 correct.

22 Q. BY MS. SILVERSTEIN: Earlier I
23 asked you where you got a couple different
24 pieces of data that you used in your
25 post-audit; for example, the pumping rate

1 data. Do you remember when I asked you those
2 questions?

3 A. Yes, uh-huh.

4 Q. And you told me that the legal
5 team gave you that data; is that right?

6 A. Correct.

7 Q. Who on the legal team gave you
8 that data?

9 A. I don't recall.

10 Q. Okay. Was that data provided,
11 like, via email?

12 A. I don't know if it was email or
13 from, like, a secure fold -- you know,
14 SharePoint or secure download folder. I -- I
15 can't -- can't remember.

16 Q. Okay. And when you refer to,
17 like, a legal team, who do you include in
18 that -- that description?

19 MS. BAUGHMAN: I'm going to
20 object to that. I don't think that
21 you're allowed to know who he's
22 communicating with on the team. I
23 think that's confidential.

24 MS. SILVERSTEIN: I disagree.
25 I think we're allowed to know where he

1 got it. Who provided him specific
2 data.

3 MS. BAUGHMAN: He said the
4 legal team provided the data.

5 THE WITNESS: Yeah.

6 MS. BAUGHMAN: That's -- that's
7 specific enough.

8 MS. SILVERSTEIN: To be clear,
9 are you instructing him not to answer?

10 MS. BAUGHMAN: He already
11 answered. He said he didn't know.

12 MS. SILVERSTEIN: Okay. I --

13 MS. BAUGHMAN: He doesn't
14 remember.

15 Q. BY MS. SILVERSTEIN: When you
16 say "the legal team," who -- who makes up the
17 legal team?

18 MS. BAUGHMAN: Objection. Form
19 and foundation.

20 THE WITNESS: I don't know all
21 of the people. I -- I would say for
22 the vast majority of my communi- --
23 well, all my communication has gone
24 through these -- these two
25 individuals.

1 Q. BY MS. SILVERSTEIN: Okay. You
2 also mentioned earlier that you had taught
3 courses on water modeling; is that right?

4 A. Correct.

5 Q. Where did you teach courses on
6 water modeling?

7 A. Various locations across the
8 world.

9 Q. When you say "various
10 locations," do you mean at universities?

11 A. Sometimes at universities.

12 Q. Okay. What universities?

13 A. Like the University of Liege in
14 Belgium. University -- you know, some
15 universities, some were given at, like, in
16 conference rooms and at -- at various places.
17 So sometimes it happened at a hotel room,
18 sometimes it happened at a university, so
19 it -- it varied.

20 Q. And when you say "courses," do
21 you mean, like, a -- a semester-long course
22 at a university or are you referring to,
23 like, a day or two-day long lecture?

24 A. Usually they were a week
25 long -- a week-long course.

1 Q. Okay. And how many of these
2 courses have you taught?

3 A. Dozens, at least, if not more.
4 Probably more than a hundred.

5 Q. And what subject matters did
6 you teach?

7 A. Groundwater principles,
8 groundwater hydrology, hydrogeology,
9 groundwater modeling, fate and transport.
10 All centered around groundwater hydrogeology
11 and modeling.

12 Q. Are these courses all listed on
13 your resum??

14 A. No.

15 Q. Do you maintain a list of the
16 courses that you've taught?

17 A. No.

18 Q. Okay. Have you ever been,
19 like, hired as a full-time professor
20 or instructor?

21 A. No, no.

22 Q. Would it be fair to say that
23 these -- that your course at University of
24 Liege was, like, a guest lecture kind of
25 course?

1 A. I don't know if it would be
2 classified as a guest lecture. We went there
3 and people came to participate in the
4 training course.

5 Q. When you say "people came to
6 participate in the training course," were
7 these, like, university students?

8 A. Sometimes.

9 Q. Okay. What other kind of -- if
10 they weren't all university students, who
11 else took these?

12 A. Consultants, government --
13 government people. You know, both academia,
14 non-academia consultants.

15 Q. Did you prepare -- do you
16 prepare, like, a syllabus or --

17 A. Yes.

18 Q. -- for these courses?

19 A. Yes.

20 Q. Have you maintained the
21 syllabi?

22 A. No.

23 Q. Do you use -- do you have,
24 like, a standard syllabus that you use or is
25 it different for each course?

1 A. It -- it varied. You know, a
2 lot of times it was a standard -- a standard
3 format, but sometimes it was adjusted,
4 depending on where we -- where I was going.

5 Q. When did you most recently
6 teach a course on groundwater modeling?

7 A. Probably 2009, 2010.

8 Q. Is there a reason that you
9 haven't taught any courses since 2009 or
10 2010?

11 A. My career shifted from doing
12 training and some consulting to consulting
13 100 percent of the time.

14 Q. And that change was around
15 2010?

16 A. Yes.

17 Q. Have you ever worked -- prior
18 to your retention for the Camp Lejeune
19 litigation, had you ever worked with Morris
20 Maslia?

21 A. No.

22 Q. Were you familiar with
23 Mr. Maslia at all?

24 A. No.

25 Q. Had you -- prior to your

1 retention for the Camp Lejeune litigation,
2 had you ever worked with Mustafa Aral?

3 A. No.

4 Q. Were you familiar with
5 Dr. Aral's work?

6 A. No.

7 Q. Had you ever worked with --
8 prior to your retention for the Camp Lejeune
9 litigation, had you ever worked with
10 Dr. Konikow?

11 A. No, but I've known him
12 throughout my career.

13 Q. How do you know him?

14 A. Well, most recently he was the
15 editor of Groundwater journal, and I sit on
16 the board of directors for the National
17 Groundwater Association.

18 Q. Okay. And I'm not familiar
19 with how those two organization -- the
20 national association --

21 A. Yeah, the Groundwater journal
22 is published by the National Groundwater
23 Association.

24 Q. Okay. And so did you interact
25 with Dr. Konikow in -- on your role on the

1 board?

2 A. To the extent that we would see
3 each other at our annual meeting.

4 Q. Had you ever worked with
5 Dr. Sabatini prior to your retention in the
6 Camp Lejeune litigation?

7 A. No.

8 Q. Were you familiar with
9 Dr. Sabatini?

10 A. I don't know him.

11 Q. Have you read USGS's 2004
12 report "Guidelines for evaluating groundwater
13 flow models"?

14 A. I'm familiar with that
15 document. I wouldn't say that I've read it
16 recently, but I am familiar with it.

17 Q. And in your opinion, is USGS a
18 reliable source?

19 A. Yes.

20 MS. BAUGHMAN: Objection to
21 form.

22 Q. BY MS. SILVERSTEIN: And did
23 you review Dr. Konikow's report prior to
24 submitting your rebuttal report?

25 A. His -- the only report I'm

1 aware of is his rebuttal report, which I read
2 after our rebuttal report was submitted.

3 Q. Do you agree with Dr. Konikow's
4 opinions?

5 A. Yes.

6 Q. Have you reviewed
7 Dr. Sabatini's report?

8 A. Briefly. I mean, not -- not
9 fully, yeah.

10 Q. Do you agree with
11 Dr. Sabatini's opinions?

12 A. I don't have an opinion.

13 Q. Did you review Morris Maslia's
14 report?

15 A. His rebuttal report?

16 Q. Did you review his initial
17 report?

18 A. Yes.

19 Q. And do you agree with his
20 opinions in --

21 A. Yes.

22 Q. -- his initial report?

23 Did you review Mr. Maslia's
24 rebuttal report?

25 A. Yes.

1 Q. Do you agree with his opinions
2 in his rebuttal report?

3 A. Yes.

4 Q. And did you review Dr. Aral's
5 report?

6 A. Briefly, I believe.
7 His original report?

8 Q. Yes.

9 A. I don't recall.

10 Q. Do you agree with Dr. Aral's
11 opinions?

12 MS. BAUGHMAN: Objection.
13 Form.

14 THE WITNESS: It would be hard
15 to agree to his opinions if I can't
16 remember what they are.

17 Q. BY MS. SILVERSTEIN: Okay. Did
18 you -- for your rebuttal report, did you
19 consider the expert report from Dr. Jay
20 Brigham?

21 A. No.

22 Q. Did you review the report of
23 Kyle Longley?

24 A. No.

25 Q. When you were preparing your

1 initial report and the rebuttal report, did
2 you review any academic texts?

3 MS. BAUGHMAN: Other than
4 what's cited in the reports?

5 THE WITNESS: Yeah, I don't --

6 MS. BAUGHMAN: I object to the
7 form. He's got citations in the
8 reports.

9 THE WITNESS: Yeah, outside of
10 the ones that are cited, I -- I don't
11 remember offhand if there were
12 academic papers.

13 Q. BY MS. SILVERSTEIN: Are there
14 any texts, meaning studies, textbooks,
15 guidebooks that you consider to be reliable
16 authorities in the field of groundwater
17 modeling?

18 MS. BAUGHMAN: Objection.
19 Form. Overbroad.

20 THE WITNESS: Yeah, there's
21 lots of books. Many that sit on my
22 shelf.

23 Q. BY MS. SILVERSTEIN: Okay.
24 What are some of the books that you consider
25 to be reliable authorities in groundwater

1 modeling?

2 MS. BAUGHMAN: Object to the
3 form.

4 Reliable for every single
5 statement stated in each of the books?
6 Is that what you're asking him?

7 Q. BY MS. SILVERSTEIN: If someone
8 asked you --

9 MS. BAUGHMAN: Be careful.

10 Q. BY MS. SILVERSTEIN: -- is this
11 a reliable authority in groundwater
12 modeling --

13 A. Yeah.

14 Q. -- what text would you provide?

15 MS. BAUGHMAN: Objecting to the
16 form.

17 THE WITNESS: Like the Anderson
18 Woessner book, that's a reliable --
19 that's a reliable book.

20 Q. BY MS. SILVERSTEIN: Are you
21 referring to Applied Groundwater Modeling --
22 Monitoring?

23 A. Modeling.

24 Q. Modeling, excuse me.

25 A. Yes, yeah.

1 Q. Are you familiar with
2 groundwater -- Modeling Groundwater Flow and
3 Contaminant Transport by Jacob Bear and
4 Alexander H.-D. Cheng?

5 A. Yes.

6 Q. Do you consider that to be a
7 reliable authority?

8 A. Yes.

9 MS. BAUGHMAN: Object to the
10 form.

11 Q. BY MS. SILVERSTEIN: A minute
12 ago you mentioned the Anderson text. Do you
13 consider the 1992 version to be a reliable
14 authority?

15 MS. BAUGHMAN: Objection to the
16 form.

17 If -- if you would need to look
18 at it first to make sure what they've
19 stated is reliable, then don't answer.

20 THE WITNESS: Okay. I would
21 have to review it.

22 Q. BY MS. SILVERSTEIN: When you
23 said earlier that you consider the
24 Anderson --

25 A. Yeah.

1 Q. -- text to be reliable --

2 A. Yes.

3 Q. -- would that include the 1992
4 and 2015 versions?

5 MS. BAUGHMAN: Objection.

6 Form.

7 THE WITNESS: Yes, I would say
8 so.

9 Q. BY MS. SILVERSTEIN: Are you
10 familiar with the text Guidelines for
11 Evaluating Groundwater Flow Models by
12 Thomas E. Reilly and Arlen W. Harbaugh?

13 A. Not sure if I've read that one.

14 Q. Okay. Are you familiar with
15 the Standard Guide for Calibrating a
16 Groundwater Flow Model Application by the
17 American Society for Testing and Materials
18 International?

19 A. I'm aware of that document.

20 Q. Do you consider that to be
21 reliable?

22 MS. BAUGHMAN: Object to the
23 form.

24 THE WITNESS: Yes.

25 Q. BY MS. SILVERSTEIN: Are you

1 familiar with the text Calibration and
2 Uncertainty Analysis for Complex
3 Environmental Models by John Doherty?

4 A. Yes, I'm -- I'm -- I'm familiar
5 with that document.

6 Q. Do you consider that document
7 to be reliable?

8 A. Yes.

9 MS. BAUGHMAN: Object to the
10 form.

11 THE WITNESS: Yes.

12 Q. BY MS. SILVERSTEIN: Are you
13 familiar with the work of Dr. Clement?

14 MS. BAUGHMAN: Object to the
15 form.

16 THE WITNESS: Yes.

17 Q. BY MS. SILVERSTEIN: Do you
18 consider Dr. Clement to be an authoritative
19 figure in groundwater modeling?

20 MS. BAUGHMAN: Object to the
21 form.

22 THE WITNESS: Yes.

23 Q. BY MS. SILVERSTEIN: Earlier I
24 asked you about groundwater modeling projects
25 that you had worked on. Do you remember that

1 discussion?

2 A. Yes.

3 Q. And you said that there were
4 hundreds of projects that you had worked on
5 that were not listed in your CV; is that
6 right?

7 A. That's correct.

8 Q. Why are they not all listed in
9 your CV?

10 A. Because my -- I would say
11 because I'm a consultant and my resum? or CV
12 gets distributed to clients and potential
13 clients on a regular basis, and they don't
14 need to see hundreds of pages.

15 Q. How do you determine which
16 projects to list on your CV?

17 A. I try to find ones that are
18 representative and current.

19 Q. By "current" do you mean ones
20 that you've worked on in the last couple of
21 years?

22 A. Most recent, yes.

23 Q. Okay. Do you maintain a list
24 of all of the groundwater modeling projects
25 you've worked on?

1 A. No.

2 Q. Earlier I asked you questions
3 about a couple of the projects that you have
4 worked on, including, I think, one for
5 New Jersey that you said was confidential.

6 Do you remember that?

7 A. Yes.

8 Q. And are you maintaining your
9 position that you can't answer questions
10 about that work because it's confidential?

11 MS. BAUGHMAN: About the
12 New Jersey one?

13 MS. SILVERSTEIN: Yes.

14 THE WITNESS: Yes.

15 MS. SILVERSTEIN: Okay. We are
16 reserving our right to seek additional
17 information regarding the confidential
18 projects --

19 THE WITNESS: Sure.

20 MS. SILVERSTEIN: -- that
21 Mr. Davis declined to testify about.

22 THE WITNESS: Sure.

23 Q. BY MS. SILVERSTEIN: Earlier I
24 also asked you if you had been involved in
25 any personal litigation.

1 Do you remember that?

2 A. Yes.

3 Q. And you said -- you said other
4 than your divorce there wasn't anything?

5 A. Correct.

6 Q. Have you ever been involved or
7 filed for bankruptcy?

8 A. Yes.

9 Q. And have you been involved in
10 any creditor suits?

11 A. No.

12 MS. SILVERSTEIN: Okay. I
13 don't have any more questions at this
14 time.

15 Thank you so much for your time
16 today. I know it was a really long
17 day.

18 THE WITNESS: That's okay.
19 Thank you.

20 MS. BAUGHMAN: I have a few
21 questions.

22 EXAMINATION

23 BY MS. BAUGHMAN:

24 Q. Okay. Just going back to
25 question -- a topic that we were just asking

1 about where you talked about hundreds of
2 groundwater modeling projects that you've
3 worked on that aren't on your CV.

4 My question about that is: Did
5 any of those projects involve hindcasting or
6 looking back in time to model?

7 A. I'm -- I'm sure they did.

8 Q. Can you -- can you give us an
9 estimate about how many times you've done
10 that -- that sort of a reconstruction or
11 hindcasting of groundwater flow and
12 contaminant transport?

13 A. More than one, less than a
14 hundred. I don't -- I don't know. I mean...

15 Q. I mean, you've talked about
16 more than one already today, so --

17 A. Yeah, it was multiple -- it was
18 multiple times. It's not -- it's not an
19 uncommon thing.

20 Q. For -- for you to do?

21 A. Yes.

22 Q. And to be done in your field?

23 A. Correct.

24 Q. Okay. You were asked a kind of
25 general question earlier in the deposition,

1 very early in the deposition, about whether
2 it's important to understand the purpose of a
3 model, and you said it was important because
4 it's the foundation of what you were doing.

5 I want to talk about that with
6 respect to work that was done by the ATSDR.

7 A. Okay.

8 Q. In your opinion, would the
9 ATSDR need to know how the mean monthly
10 contaminant levels would be used by a health
11 professional in order to perform their
12 modeling?

13 A. No.

14 MS. SILVERSTEIN: Objection.

15 Q. BY MS. BAUGHMAN: So when you
16 said it was important to understand the
17 purpose of the model, what did you mean? Did
18 you mean understanding what --

19 MS. SILVERSTEIN: Object to
20 form.

21 Q. BY MS. BAUGHMAN: -- in the
22 context of ATSDR?

23 MS. SILVERSTEIN: Object to
24 form.

25 THE WITNESS: The purpose would

1 be, okay, what are we trying -- what
2 are we trying to get out of this
3 model; not necessarily how it could be
4 possibly used, but what are the
5 results, what are we trying to get out
6 of this --

7 Q. BY MS. BAUGHMAN: And here --

8 A. -- model.

9 Q. -- that was what?

10 A. In this particular case, they
11 were trying to get mean monthly averages at
12 the treatment plant.

13 Q. Okay. Earlier today -- okay.
14 You testified earlier today that -- I think
15 you said something about the ATSDR are not
16 doing a good job when modeling
17 concentrations -- simulating concentrations
18 when the levels were low.

19 Do you remember that testimony?

20 A. Yes.

21 Q. What did you mean by that?

22 A. It's probably best if I
23 compare -- use the word "compared." So
24 compared to the locations where high
25 concentrations, the model didn't do as good

1 of a job.

2 Q. At the lower?

3 A. At the lower concentrations
4 compared to how well it did to the locations
5 where the concentrations were high.

6 Q. Okay. Very recently you were
7 asked in the deposition about Dr. Clement and
8 whether you considered him to be, I don't
9 know, someone who's reputable in your field.
10 Do you recall that?

11 A. Yes.

12 Q. And you're familiar with
13 Dr. Clement's work?

14 A. Yeah. We are -- we are
15 friends.

16 Q. Does that mean do you agree
17 with everything Dr. Clement has published --

18 A. No.

19 Q. -- in the groundwater field?

20 A. No, that does not mean that.

21 Q. And specifically with respect
22 to Camp Lejeune, do you -- are you -- do you
23 agree with what Dr. Clement has published?
24 To the extent you're familiar with it.

25 A. I am aware that he has

1 written -- has written material about this
2 particular site. It's my understanding or my
3 opinion that he was more critical of the
4 TechFlowMP modeling approach than he was with
5 the MODFLOW MT3D --

6 Q. Okay.

7 A. -- approach.

8 Q. When you said that you consider
9 him to be authoritative, that didn't mean you
10 agreed with his opinions --

11 A. No, that does not mean --

12 Q. -- regarding Camp Lejeune?

13 A. Correct.

14 Q. Okay. And, similarly, you --
15 you talked about whether various textbooks
16 and published books are -- I think the word
17 was used "reliable" -- does that mean you
18 agree with all of the opinions and statements
19 in each of those books?

20 A. It would be hard to agree with
21 all of the opinions and statements because
22 you would have to go through page by page of
23 all those textbooks.

24 Q. And you didn't do that --

25 A. No.

1 Q. -- in order to answer those
2 questions?

3 A. No.

4 MS. BAUGHMAN: All right. I'll
5 pass the witness.

6 MS. SILVERSTEIN: I just have a
7 couple more questions.

8 THE WITNESS: Sure.

9 EXAMINATION

10 BY MS. SILVERSTEIN:

11 Q. You said that the groundwater
12 modeling projects that were not listed on
13 your CV, some of those included hindcasting
14 work; right?

15 A. Yes.

16 Q. How many times in the projects
17 that you -- all of the groundwater modeling
18 projects that you've worked on, how many
19 times have you estimated the absolute
20 contaminant concentration to determine a
21 specific person's exposure level?

22 MS. BAUGHMAN: Objection.

23 Form. Foundation. It's outside the
24 scope of his job to do that.

25 THE WITNESS: Yeah, I -- I

1 would say -- you're asking me how the
2 model may have been used, and I don't
3 know the answer to that.

4 Q. BY MS. SILVERSTEIN: So you're
5 not aware of any times that the -- any
6 instances in which the model -- modeling that
7 you've done has been used to determine the
8 exposure for a specific person; is that
9 right?

10 MS. BAUGHMAN: Objection. Form
11 and foundation.

12 THE WITNESS: I'm not saying
13 that it's not possible. I'm not aware
14 of it.

15 MS. SILVERSTEIN: Okay. I have
16 no more questions.

17 MS. BAUGHMAN: Okay. We're
18 finished.

19 THE WITNESS: Okay.

20 THE VIDEOGRAPHER: We're off
21 the record. The time is 5:44.

22 (The deposition was concluded at 5:44 p.m.)

23 -oOo-

24

25

Reporter's Certificate

State of Utah)
County of Salt Lake)

I, Vickie Larsen, Certified Court
Reporter and Registered Merit Reporter in the
State of Utah, do hereby certify:

THAT the foregoing proceedings were
taken before me at the time and place set
forth herein; that the witness was duly sworn
to tell the truth, the whole truth, and
nothing but the truth; and that the
proceedings were taken down by me in
shorthand and thereafter transcribed into
typewriting under my direction and
supervision;

THAT the foregoing pages contain a true
and correct transcription of my said
shorthand notes so taken.

IN WITNESS WHEREOF, I have subscribed
my name this 18th day of February, 2025.



Vickie Larsen, CCR/RMR
Utah License No. 109887-7801
Nevada License No. 966

I, R. JEFFREY DAVIS, HEREBY DECLARE:
That I am the witness referred to in the
foregoing testimony; that I have read the
transcript and know the contents thereof;
that with these corrections I have noted this
transcript truly and accurately reflects my
testimony.

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-----	No corrections were made.	-----

I, R. JEFFREY DAVIS, hereby declare under the penalties of perjury of the laws of the United States of America and the laws of the State of Utah that the foregoing is true and correct.

Dated this _____day of _____,
2025.

R. JEFFREY DAVIS

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